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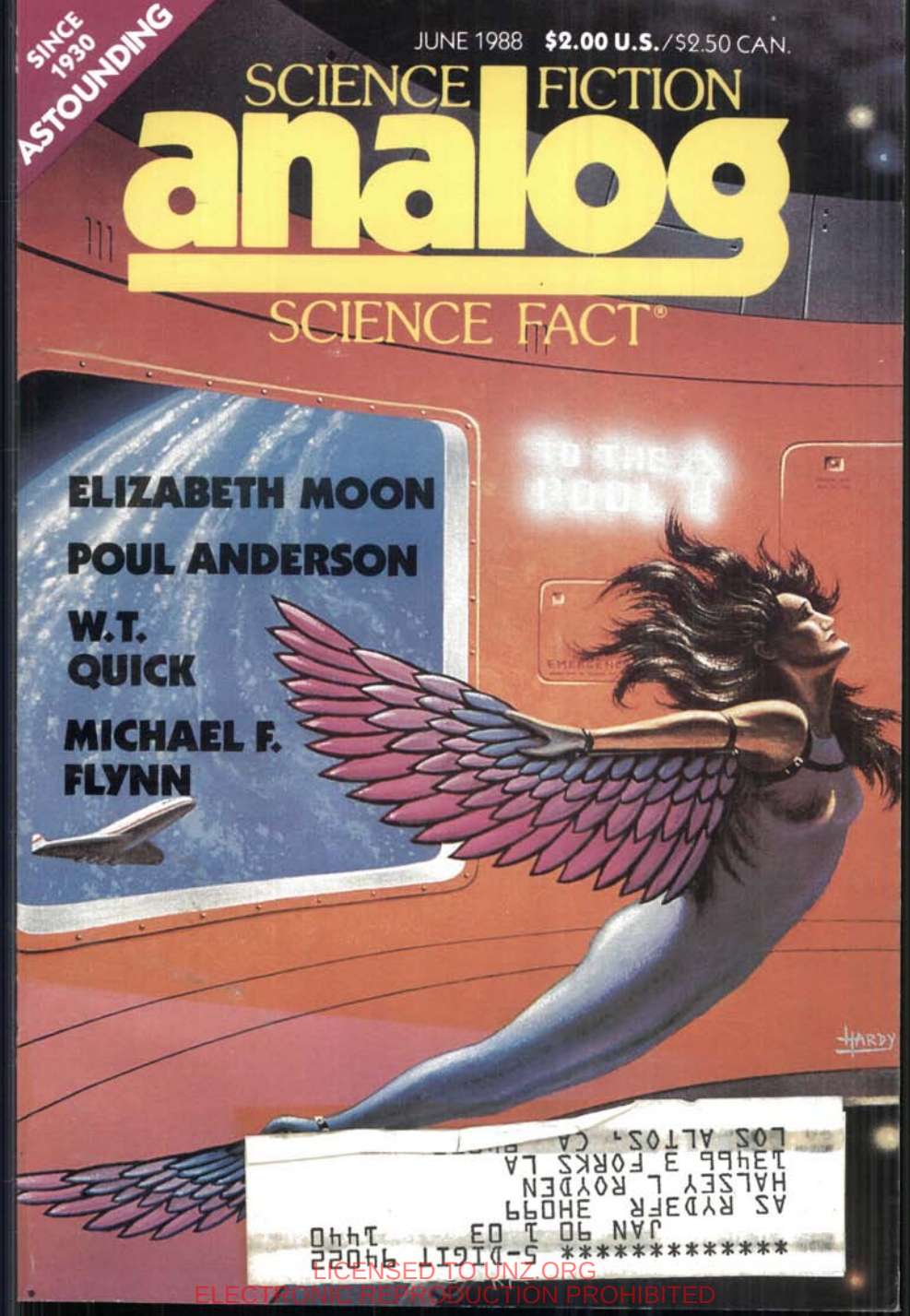

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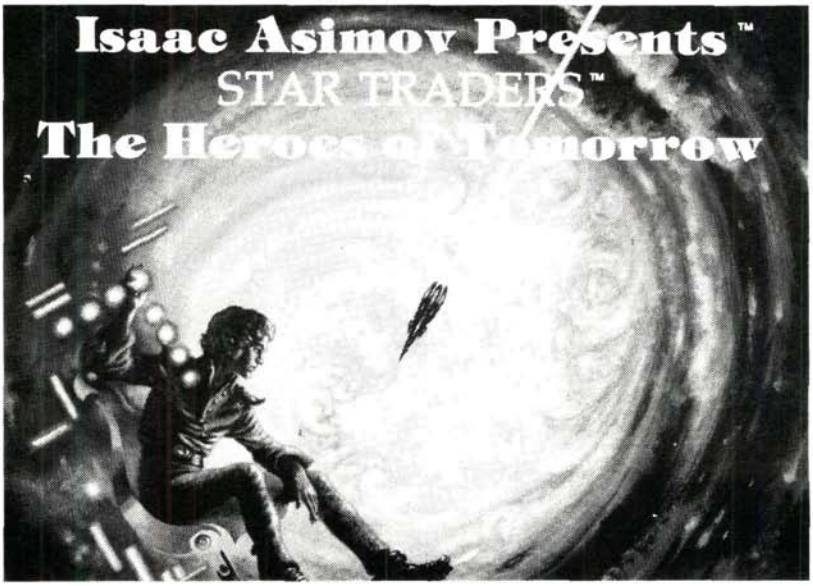

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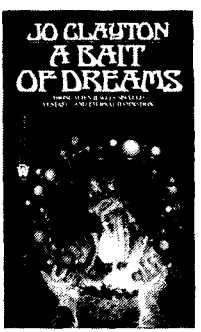

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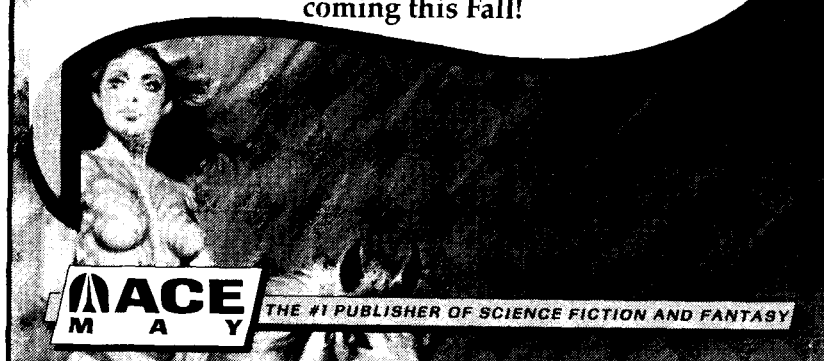

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Editorial

POPULATION ETHICS

Stanley Schmidt

Over the last few years, editorials and stories in *Analog* have occasionally touched on the matter of abortion and the ethical, legal, and philosophical problems associated with it. It's one of those subjects guaranteed to produce a flood of letters. It doesn't matter what you *say* about it; many people feel so strongly about it that they react heatedly (and often in ways that have little to do with what you did say) to the mere mention of the word. So we've had lots of letters on this subject, and printed as many of them as we could.

One of the most significant of these letters was a commentary on most of the others. In our October issue, L. Sprague de Camp quite correctly pointed out that in all the brouhaha over abortion, nobody seemed to remember that that is closely entangled with a much larger problem: the fact that population grows exponentially. If *something* isn't done to reduce present worldwide rates of growth, crowding and starvation and a whole complex of related problems are going to become so serious that they will overshadow virtually all other considerations. De Camp's contention is that abortion is one of the tools that is needed to forestall those problems. Other tools might be preferable, but so far they haven't worked well enough to do by themselves what needs to be done. Until and unless they can be made to do so, abortion will be needed as one of the ways of keeping overpopulation at bay.

Quite predictably, de Camp's letter provoked a few angry reactions from other readers—mostly antiabortionists whose opposition to abortion overshadows their view of the larger problem. Admittedly, some of them concede that the population problem exists but warn

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that simplistic solutions won't work; they do not, however, admit the possibility that an approach that refuses to consider abortion as one option may *be*, at least for now, a simplistic and unworkable solution.

That is not my concern today. I'll leave the sympathizers and attackers of de Camp to thrash out methodology among themselves. *From here on out, this editorial is* not *about abortion* (or any other specific method of population control). It is about the larger problem itself: the ethical and philosophical questions that come with the ability and the need to control population at all, regardless of method.

It's a relatively new problem, and fairly typical of the kind of new problem that routinely accompanies the acquisition of new abilities. When you learn to do something your ancestors couldn't, you have to decide what you can and should do with it. Until recently, there was relatively little that people could do to control population growth. Conveniently, there was seldom much need for them to try. Populations were still so small, land so plentiful, and infant mortality so high, that existing populations pretty clearly needed all the children they could get. In biblical times, when life was arduous and usually short, a simple injunction like "Be fruitful and multiply" made perfectly good sense. In this century, for several reasons, qualifications have become necessary. For the first time, populations and growth rates have become high enough to be fairly widely perceived as a problem; and for the first time, a variety of easy methods have become available to significantly alter growth rates. For a while, in the late '60s and early '70s, there was a good deal of popular interest in the dangers of overpopulation and what might be done about them. Now, as de Camp points out, that has faded away. What people think about, it seems, is determined less by what is important than by what is fashionable. But the passing of the fad does not make the problem go away. It is still there, still important, and what I hope to do this month is to get people thinking about it again.

It's quite a peculiar problem, actually, with several unusual or even unique aspects. What I'd like to do to get things started is to comment briefly on several of those.

—At least one reader considers worries about overpopulation "needless," pointing out that nature always takes care of such things. Well, of course it does—but nature's solutions often involve plagues and extinctions. This doesn't bother people who don't expect to be among the casualties, but those who think they might would prefer another way. This reader specifically cites AIDS as something which promises to solve two problems at once: overpopulation and "unbridled hedonism." With something like what Mark Twain once called "the serene confidence of a Christian with four aces," he looks forward to the selective elimination of people who can't "control their impulses or consider the consequences of their actions." He conveniently ignores the fact that the consequences he's talking

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about did not *exist* until quite recently, and so are utterly irrelevant to judgments of the "immorality" of such actions taken before they did exist. That fact leads us to a basic principle that is particularly relevant to population ethics. In this example, the consequences of certain actions, and therefore the moral view that must be taken of them, has *changed*. In general, *morality is a function of time*.

This precept is violently unacceptable to individuals and institutions which want—and think they can have—the security of simple rules that never change. But the fact remains that what is beneficial under one set of circumstances may be disastrous under another. Population control is a prime example of that fact. Some of our ancestors needed

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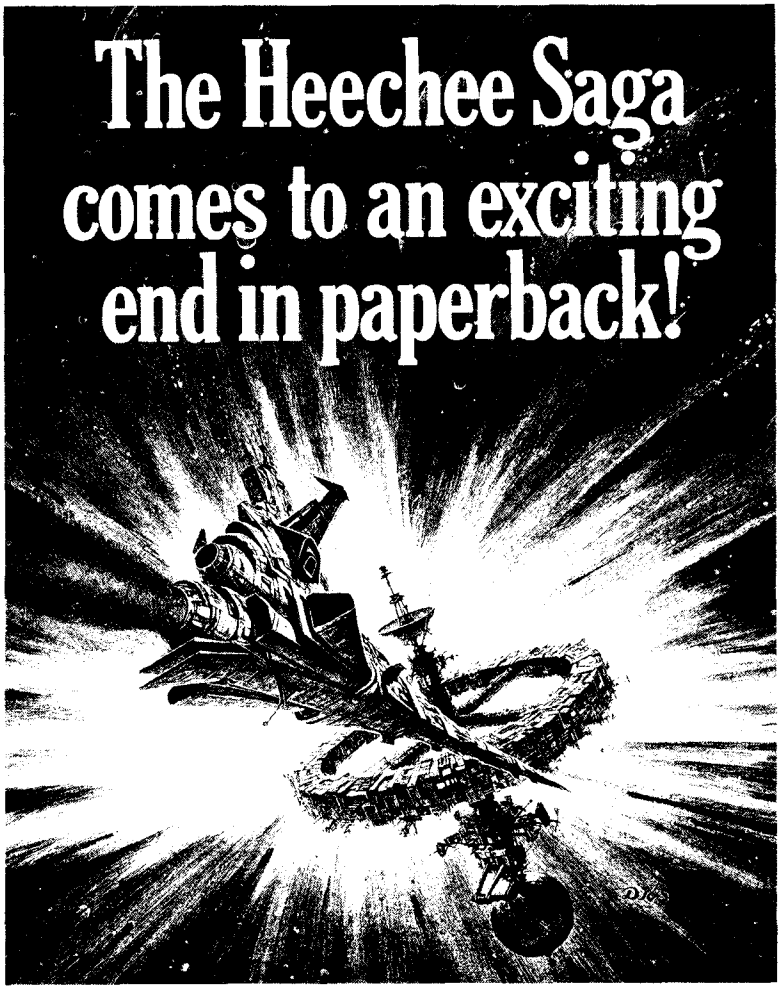

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to do all they could to encourage population growth; we need to find ways to slow it down. (The situation could, of course, change back. My novel, *Lifeboat Earth*, is set less than a hundred years in the future, but envisions a situation in which extreme measures are needed to forestall not overpopulation, but extinction. And it's quite easy to imagine other ways that could happen.) The policies and practices of any time and place need to reflect the problems and needs of that time and place. It may be possible to formulate rules which are generally applicable, but they need to be formulated in such a way that they can make allowance for changes in circumstances. In the case of population, any institution which simply insists that *no* control is *ever* permissible is not helping.

—Even as the same actions are not appropriate or necessary for all times and places, *the same actions are not appropriate or necessary for all people in a particular time and place*. Philosophy students will remember Immanuel Kant's "categorical imperative," one of the more usable formulations of which runs, "Act only on such a maxim as you can will that it should become a universal law." Many people seem able to will their own preferences into universal law with the greatest of ease, and so we find people of all stripes expressing dismay at other people's behavior by pointing out what would happen "if everyone did that. . . ." What they don't point out is that this "what if" becomes relevant only if there is a real likelihood that everyone (or almost everyone) *will* do that. We have ZPGers aghast that someone has chosen to have five or six children, and radio commentators piously decrying the "selfishness" of those who have none. Either large families or childlessness would lead to disaster if everybody did it—but everybody doesn't. We can afford some of both, as long as the *average* number of children being produced remains reasonably close to the "replacement rate" that would keep the population stable. (That rate, by the way, is popularly equated to two per couple—which is significantly wrong. More on that later . . .)

—A key question that has to be considered in long-range planning of population strategies is *what is the carrying capacity of the planet* (or whatever space is available, be it an island or a galaxy)? The time to answer this is *before* that capacity is reached. One of the difficulties in answering it is that people differ in how much crowding they consider acceptable. The Earth's population is now about five billion; I recently read an estimate that it can accommodate twice that. It probably can—but how many of us would be happy living under the conditions necessary to share it with that many others? Some of us like living in Manhattan; there may even be some who like living in Calcutta. Others of us get uncomfortable when our rural surroundings start looking too much like suburbia. Space colonies will provide *some* options for spreading out and choosing living conditions—but it is naive to think that they will ever provide an escape valve that will eliminate the pressures of population growth on Earth. People in space will reproduce too, you know.

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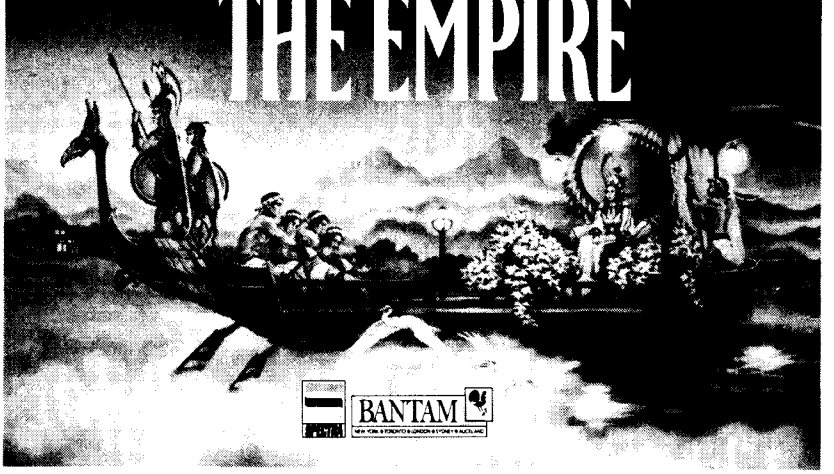

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—A crucial question in population ethics—and one respect in which this branch of ethics is unique—is: *what ethical obligations do we have to the unborn?* I must hasten to add, lest someone seize this as a cue to change the subject back to abortion, that I am *not* talking here about fetuses which have been conceived but not delivered. I mean *people who do not yet exist*, in *any* physical sense.

Many people have felt gratitude to their parents for the gift of life—but life is a truly unique kind of gift. It *has been given* to those who have it—but no one is deprived of it when it is not given. It is meaningless to describe voluntary childlessness as "selfish," because the recipients of what is supposedly being withheld do not and will not ever exist. It may be, of course, that some childless individuals are selfish, and show it in other ways. On the other hand, some of them may actually be showing more concern for other people, by not contributing to overpopulation, than some parents who have children only as a form of self-gratification or vicarious immortality. We have no obligations toward individuals who do not and will not exist; we cannot owe, deprive, or do anything else to beings who exist nowhere in spacetime. We *do* have duties toward those who don't now exist but will in the future, even though we don't yet know specifically who they will be.

—The language we have inherited does not make it easy to think clearly about such considerations, but think about them we must—for *the problem will very likely get worse before it gets better*. So far we have a population which is growing by "natural" means and just beginning to notice that it is straining its resources. It is also just beginning to notice that it has means at its disposal to do something about the problem, and to confront the fact that neither the problem nor the available solutions fit comfortably into old frameworks of belief. If that were all there is to it, we might hope that a little time will work things out. But time alone won't—people have to *use* time, not just live through it—and that's *not* all there is to it. There are important new options on the horizon, offering (as usual) both new solutions and new problems.

We've had several items in these pages recently about the possibilities of cryonic preservation and molecular cell repair machines. The latter are a probably inevitable manifestation of nanotechnology which will give people the chance to greatly increase their lifespans. The former is a means by which some individuals who otherwise wouldn't live to see that happen may be able to bridge the gap. In the long run, cryonics will probably have a negligible impact on population growth. It's fairly expensive, the number of people using it so far is small, and it appears likely that life-extending nanotechnology will make it unnecessary and therefore obsolete within the lifetimes of people already alive. But *that* promises to have an *enormous* impact on population.

Why? Well, recall my statement that the "replacement" rate of childbearing

(continued on page 184)

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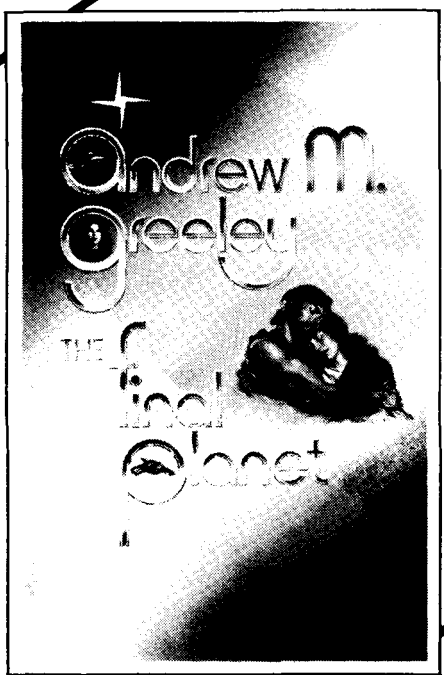

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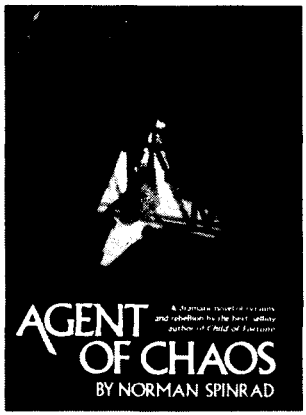

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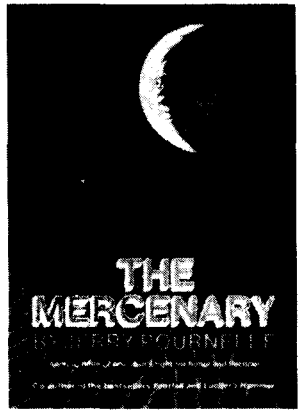

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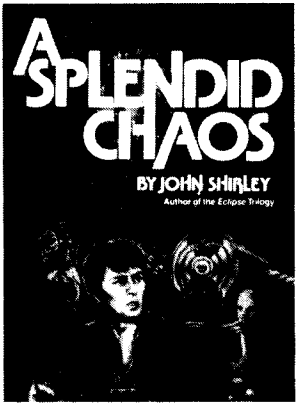

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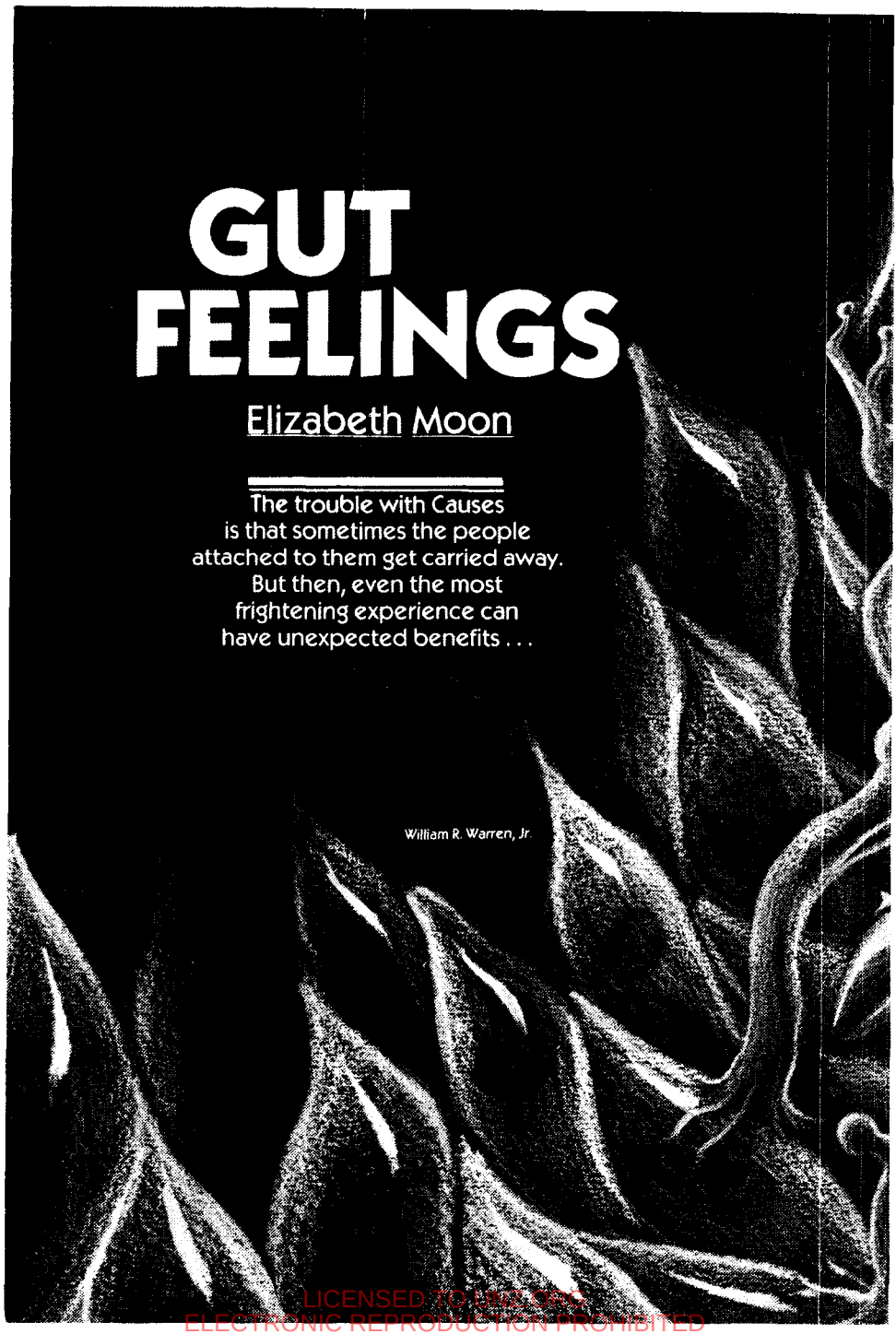

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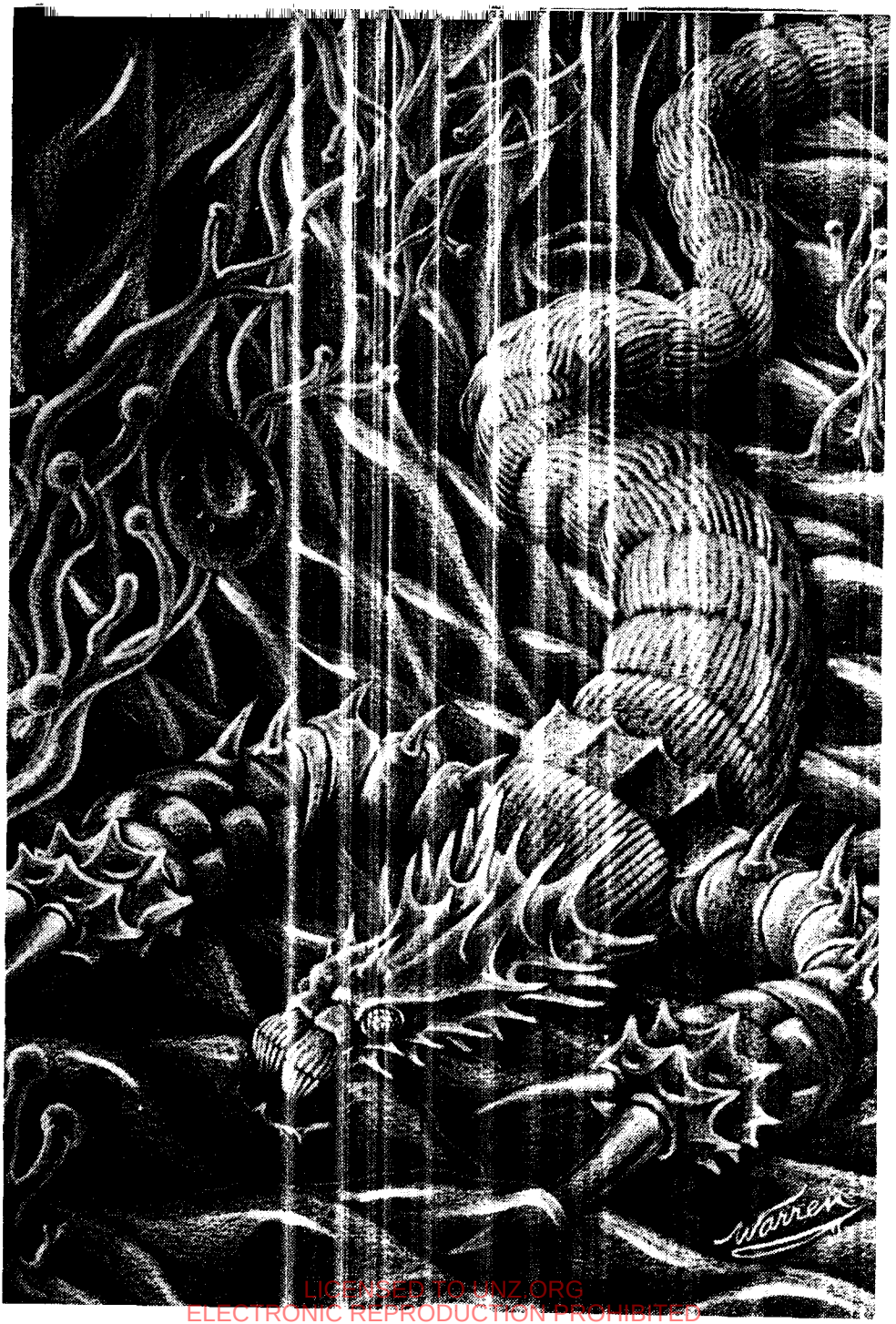

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Leonard Sanders awoke the morning after the press conference in a euphoric daze. He had done it. He—Leonard Sanders, the wimp, the nerd, the perennial underdog stepped on by everyone—*he* had been on national television, alongside famous scientists and doctors. They had praised his courage. They had talked about his contribution to research. And even though he knew they had done most of the work, he also knew they were *right:* without his contribution, his willingness to sacrifice for the good of mankind, they would never have found, tested, and proved effective the only chance for thousands of cancer victims. Colon cancer was on the run because of him . . . and his crabworms.

He sat up in bed, lifted his striped pajama top, and patted his slightly rounded belly with complete approval. His gut rumbled a little, and he chuckled.

"Hang in there, guys," he said. He imagined the odd-looking little parasites (they'd shown him micrographs of them) grazing happily along the walls of his gut, finding every single cancer cell and gobbling it down so that it couldn't grow into a big cancer and kill him.

His mood lasted through breakfast (bowl of bran cereal, glass of fruit juice, three pills), through the early news (displayed on the commuter-bus screen), and the first hour or so at work. Mr. Stevens even spoke to him, patting his shoulder with approval.

"I never realized, Lennie, that you were helping out with something like that," he said. "Guess you don't need *our* health-insurance coverage, eh?"

"Well . . . "

"Fact is," Mr. Stevens went on, "if you'd been fully covered for that familial whatsis, you might never have gotten hooked in with that research group, right?" He nodded, patted Leonard's shoulder one more time, and went off smiling to himself. Ed Grantly grinned, a friendlier grin than usual.

"Old fart's always thinking of the bottom line, ain't he?"

"I guess," mumbled Leonard. He wasn't sure quite what Ed meant, but hated to admit it. It still wasn't *fair* that the company health plan wouldn't cover his genetic illness, but Mr. Stevens had a point: the research people hadn't charged him a cent. And he was going to live. He wouldn't die of cancer, be eaten out and rotted all through the gut, as his mother had described it. . . . he was going to live. He could think of next year, and plan. He might get that transfer to inventory section. . . . even a raise. Dr. Gerson was always telling him to plan ahead. Maybe he could. For a moment, shadowy in his imagination, he saw himself going somewhere with friends, laughing, talking, just like the people on television.

He had just come back from his morning break when the day abruptly changed direction. Sylvia Goldstein called him over to her desk.

"You got a call from those guys at the hospital." Leonard nodded, and took the slip of paper with the number. She put out her hand. "Listen, you're not going to be getting personal calls all the time now, are you? 'Cause if you are, you'll have to clear it with Mr. Stevens or somebody."

Leonard straightened. "Mr. Stevens said he appreciated what I'd done. . . . "

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"Appreciation's one thing; personal calls on company time's another. Remember." She turned away. Leonard stood there a moment, then headed for his own work station. He didn't have a phone there, but he could use Ed's. He dialled the number carefully while looking sideways at his own screen, to see if an urgent request came in.

They put him straight through to Dr. Gerson. He didn't have time to wonder about that; Gerson's soothing voice flowed into the phone line.

"Leonard? Now I don't want you to worry about a thing . . . " Leonard felt his gut twist in a spasm of panic. They never told you not to worry unless there was something to worry about. "It's just a little . . . uh . . . legal problem."

"Legal?" He didn't even have a lawyer, or know how to find one.

"Yes . . . it's just a formality, Leonard, but you'll be served some papers. A deputy or constable will come by to give them to you. Don't argue with him, and don't worry about it."

"Deputy? Constable?" Leonard could hardly say the words. "They're going to *arrest* me?" His mind built a picture of a prison cell (straight from video shows) with his meager body cramped into it.

"No, no. That's not what I said. They're going to serve you—hand you some legal papers. Just take the papers, sign where they show you, and come on out to my office. That's what the papers will tell you to do, anyway. If worse comes to worst, we may have to go in and retrieve your . . . uh . . . "

"Not my *crabworms!*" He didn't realize how loud his voice was until he saw everyone's head turn, and Sylvia make an ugly face. "No!" he whispered then. "You can't!"

"Leonard, calm down. Please. Listen a moment." Dr. Gerson's voice went on, explaining something about federal regulations governing research animals, and the idiocy of some animal-rights group, and the courts, but Leonard could make nothing of it. His stomach churned, along with everything beyond it. As soon as the doctor's voice paused, he broke in.

"But you can't . . . please . . . " He choked back the tears. "*You* know—I thought everyone understood now. They're saving my *life*. They're eating my cancers out. . . . " The weight of fear he'd lived with for years landed back on him, squeezing these past few weeks of hope into invisibility like a heavy weight crushing a light bulb. Was it that fragile? Could they send him back to that life without hope?

"I know, Leonard. And it won't be for long, I'm sure. Just a few days . . . "

"I won't let you." Leonard glanced around the room, already thinking about escape. "I don't—I can't—" Beyond the double half-glass doors to the main corridor, he caught a glimpse of movement, something that might have been a uniform. He saw someone from accounting stop, point to the doors.

"Leonard—" But he had already hung up, was now shutting down his own terminal.

"Lennie! What're you—" He ignored Ed and Sylvia, darting into the service stairway where Mr. Stevens never ventured, round and round to the fire door on the next floor down. From there he took a service elevator along with two bins of shredded paper trash

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and its guardian, a lanky maintenance engineer named Frank. Frank didn't say anything, just hummed a nameless tune. Leonard felt his heart beating wildly. He could imagine the flurry in his office, the sneer on Sylvia's face, the fingers pointing to the service stairs.

Outside, Leonard blinked at the late-morning sunlight. A tan car with a shield stood in the No Parking zone in front of the main entrance some yards to his right. He could see the wire mesh separating front from back seats. He turned to his left, and walked to the corner, where he darted onto a bus just before it whooshed away. He fumbled the fare out of his pockets, struggling with the change as if he'd never handled money before. The driver gave him one quick glance of contempt. The bus was nearly empty; Leonard sat near the front and stared blindly out at the busy streets.

He didn't want to die. He had never wanted to die, that was normal. The research doctors said no one wanted to die, even suicides, but Leonard was sure he himself didn't want to die. Not since he realized he *would*, that he'd inherited his father's disease, and his gut would fill up with cancers—hundreds of them—and eventually they'd get him. He'd seen people dying of cancer, people getting treatment, all that, and to a scrawny young boy it had been a vision of the worst kind of death. If you don't go in for your checkup, his mother had threatened him, it'll just grow inside you, like rot in an orange, and someday you'll wake up with a hard knot of tumor and then . . . she'd coughed, then, her own face haggard with approaching death. And Leonard had gone to the doctor every three months, hating it, fearing it. He'd been upended on the procto table so many times, probed, scraped, sampled, and each time he came home with a painful, clenched gut and a new swelling on his personal growth of fear. Someday they wouldn't find one of the growths in time. Someday they'd miss one just a little too long, and it would turn cancerous, swell, seed itself.

He tried being good, the easy way for a boy with no talent for athletics, no personal beauty, and not enough belief in life to sample its pleasures. He did what he was told, behaved, wore a clean shirt every day. He never took drugs, got drunk, stayed out late with friends, stole or raped or vandalized. He followed the diet he'd been given, and went dutifully to each appointment. And two days after his seventeenth birthday, they'd found the first malignant growth.

"We got it all," the doctor had told him cheerfully. "Still very small. We're sure it didn't spread. But of course there might be others . . . " Leonard had nodded, all too aware of that. By then his mother was in the last stages of lung cancer, past all the chemotherapy and long past hope. He went daily after school to see her in the hospital, passing down a long hall from the elevator that stank of all the stale bodily fluids leached out by age and disease. With her last words, she reminded him that he would die the same way, and he believed her. He would die, and die horribly, and die horribly while young. So his father had died, and so he would die. He finished high school dutifully, took the first simple job he could find dutifully, and worked every day with the same blank obedience he had shown

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in school. He lived in the same bleak apartment, rode the same bus, watched the same old television every night. No use making plans: he was going to die anyway. No use making friends: they would have to watch him die, and Leonard, deeply honest, knew they wouldn't want to, any more than he'd wanted to watch his mother die. They would do it—friends did that sort of thing, at least on television—but they wouldn't want to, and he didn't intend to put anyone to any trouble.

Then had come the suggestion from his doctor that he apply to the new research project, and the project itself, and the sudden realization that he might *not* die—at least not for years. The parasites were working, eating away his cancers, and he had had, for those few months, the same feeling he got when a cloud bank suddenly lifted, letting sunlight slant under the gray and return color to the world. Dr. Gerson had pushed him to go on to night school, and he'd done it, even before he believed he had a chance. But he had had a chance: the treatment worked. And he'd felt so good, so *safe* waking up just that morning, comfortable and happy and knowing that the rumble in his gut was only hunger, not something wrong. And then . . . he pressed his head on the chill glass window, trying not to think about living with that fear again. He could not do it. He wouldn't let them. . . .

After a few miles, he realized that he couldn't just ride the bus all day. For one thing, he didn't have enough change. He looked around. Two women sat up front, chatting. Someone slumped in the back corner seat. Leonard pulled out his wallet. Thirteen dollars and—he checked his pockets as well—sixty-two cents. No, he couldn't ride the bus all day, not without getting off and getting change somewhere.

They were out of the glittering downtown, and past a grimy intermediate space of failing businesses, pawnshops, and slightly shady light industry, into an older but still respectable residential section. The bus dipped its snout, approaching a stop at a small shopping center. Leonard had never seen it before. He stood up, letting his knees cushion the sway as the bus swerved and halted. One of the two women in front stood too, and he waited a moment, careful not to bump into her, before going down the steps.

"Hurry up, buddy," said the driver. "Don't have all day, y'know."

"Sorry," mumbled Leonard. The bus doors slapped shut just behind him. Across the parking lot was an old, small member of a large supermarket chain, a fabric shop, Crestview Music Center, Miss Lila's Dance Academy, Martial Arts Supreme, and a Christian bookstore, all sharing a sidewalk and overhanging arcade. Small concrete benches offered limited seating along the wall. The woman ahead of him had aimed straight for the fabric shop; Leonard wandered toward the supermarket.

Inside, airconditioning struggled against age. The store smelled of turnip greens, onions, spices Leonard never used. One aisle was given over to oriental foods, with banners in some kind of strange script: he had no idea if it was Chinese or Vietnamese or what. But the worn flooring was clean, the counters dusted. He bought himself a tangerine,

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a can of fruit drink, and a tunafish sandwich from the display cooler. The checkout girl pointed to the store microwave, but he preferred his sandwiches cold, and ignored it on the way out. He found an empty bench in front of the fabric shop (windows full of draped fabric swirling from bolts of cloth) and ate slowly, thinking.

He might have been fired for leaving so suddenly; people had been fired for less. Jamie Artwell hadn't done any more than call Mr. Stevens a bad name in front of everyone, that time he'd told her she'd have to redo the quarterly reports. If he'd been fired, then he wouldn't be paid at the end of the week, and he couldn't pay his rent without dipping into savings. Even his savings wouldn't keep him for long . . . not more than a month or two at most. The thought of being fired, being broke, having to move (and where?) made the tunafish taste funny.

Even if they didn't fire him, they'd be mad. He could just hear Sylvia Goldstein's voice, accusing—"and what did you think you were *doing*, Lennie?," just as if she already had her promotion to section manager. The others would laugh at him. He wouldn't have a chance at the new position opening in inventory section, the one he'd hoped for. And he couldn't imagine how much trouble he mght be in with the law. Jail for years and years, probably, and never another good job like this one.

He tried to shrug off these thoughts. Dr. Gerson had told him—so had the others—that dwelling on all the things that *might* go wrong didn't help. Once you've made a decision and done something, they'd said, don't brood on the past. Easy for them. Their decisions were right, or nearly always, and even if they made mistakes they were big people, smart people, and they could talk their way out of things. He couldn't see anyone messing with Dr. Gerson.

And thinking of Dr. Gerson, there was another one who'd be mad at him. Mad at him for hanging up like that, and for not cooperating with whatever it was he'd meant. Leonard stared at the remaining half tunafish sandwich. Sylvia Goldstein was one thing, and Mr. Stevens was the same sort of person, only a man and older and richer, but Dr. Gerson—Dr. Gerson wasn't afraid of any of them. He didn't have to be. Leonard swallowed, thought about eating the rest of his sandwich, and decided against it.

He saw the blue-and-white police car turn into the shopping center parking lot as he stood up. How had they found him already? The car eased up a lane of parked cars toward the supermarket; the face Leonard could see gave him an impersonal, bored glance and moved on. Leonard forced himself to move slowly, casually, toward the doorway of the Crestview Music Center. Through smeared plate-glass he could see two pianos and a row of electronic keyboards displayed on a stepped stand. He pushed the door, and heard the first four notes of the Beethoven Fifth (never forgotten from eighth grade music appreciation) clang overhead.

"Just a minute," came a voice from the back of the store. "Be right with you." Leonard said nothing. Along the wall opposite the pianos were long racks of sheet music and music books. He stared at them (Music for Meditation;

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Three Chorales for Small Church Choirs; Bayley's Beginning Harmony Worksheets) while trying to watch the police car out the window. It had stopped in front of the supermarket. A lanky black man got out, walked into the store. Leonard turned back to the music as a gurgling roar from the back of the store suggested its owner might be coming, and where he (or she) might have been.

She was a heavy-set, gray-haired woman with bright blue eyes behind thick glasses. "Looking for anything in particular?" she asked, peering at him. She reminded Leonard of his third-grade teacher.

"Not really," he mumbled. "Just . . . just looking, really."

"Oh. Well, sacred choral's at the front, then popular choir and solo, then instrumental. I guess you're not looking to buy a piano, or anything?"

"No," said Leonard. She nodded as if she'd expected it.

"No one does, any more," she said. "Two or three keyboards a month, if we're lucky. I don't know why Mr. Parker bothers, but he says it's important to have a presence. His father had a store near here, you know: Parker Pianos. That was years ago, before the neighborhood changed, if you know what I mean." Leonard nodded, hoping she'd leave him alone. Instead, she let herself down on one of the paino benches with a little grunt; he noticed that her left knee was wrapped in an elastic bandage. "Used to be," she went on, "that all the nice children—at least the girls, and often the boys as well—all the nice children took piano. Some couldn't buy, of course, but that was no problem; Parker Pianos leased very good quality instruments. Every year, the piano classes . . . there were three teachers just in this neighborhood, you know, and those weren't the only ones. Piano music—we used to sell bundles of it. The Anderson series. Then the Purnel series. Exercise books. But not any more." She shook her head. Leonard looked away just in time to see the black policeman returning to the car with a sack. He waited for the car to drive away. It didn't.

"For awhile it was keyboards," the woman went on. "Parents kept insisting their child could practice just as well on a keyboard as on a piano. Ridiculous!" Leonard glanced at her politely, but she wasn't even looking at him, just staring at her knotted fingers spread on her thighs. He noticed the short, unpolished nails, the breadth of reach. "You can't learn fingering for great music on something only that wide." Her nod toward the keyboards made Leonard look that way too. "You see?" she challenged. Leonard nodded. She took this as evidence of interest, and turned on the bench. "Listen to this, now," she said.

Leonard did not expect the explosion of sound that erupted from the piano. Dissonance in the bass slammed against ringing chords far up the keyboard; the woman's hands worked in complete independence, each finger an individual sledge-hammer. Before Leonard could react, she'd stopped, and turned to face him. "You see?" she said again. "You can't do *that* on an electronic keyboard."

He tried to think of something polite to say, and couldn't. "It . . . it's loud," he offered.

She chuckled. "Why do you think it

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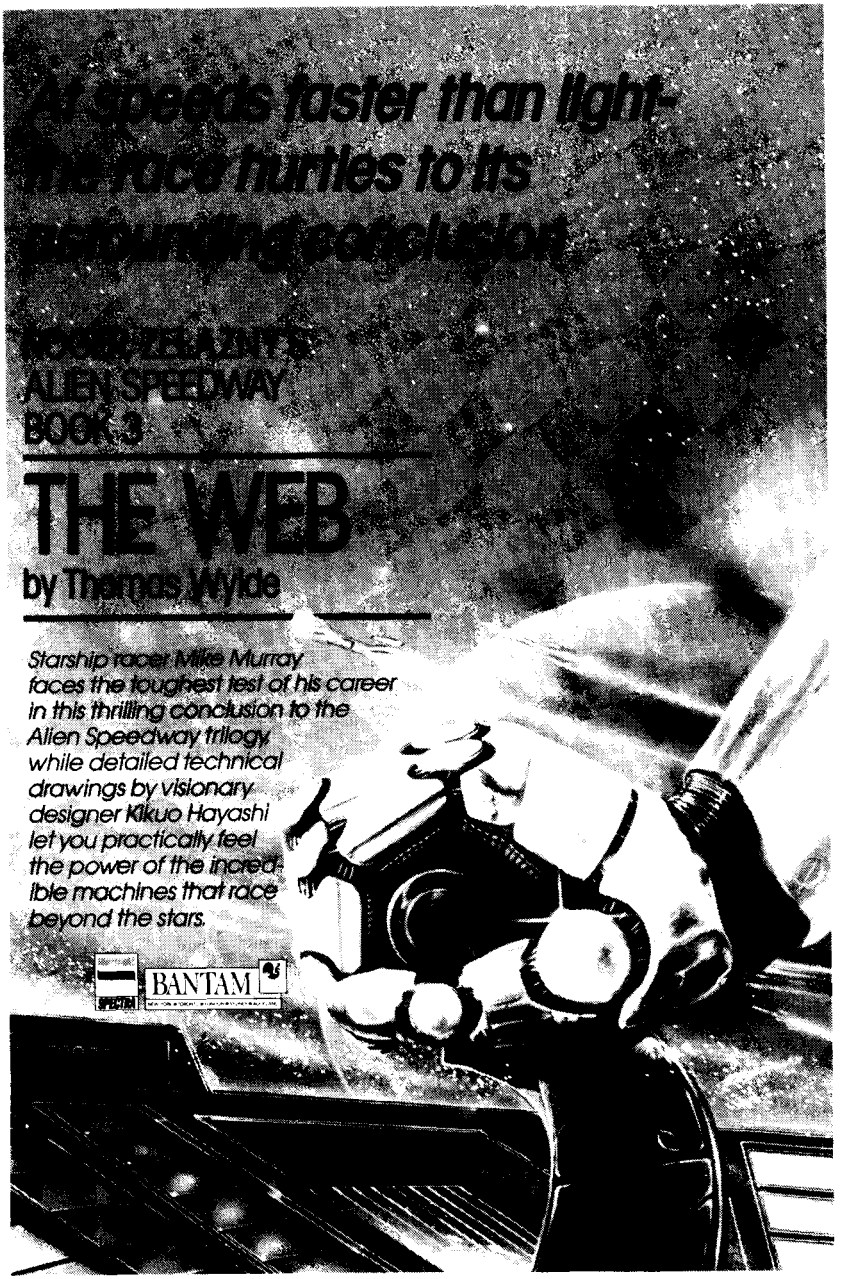
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was called a pianoforte? It's louder than that when I really let go. You liked that?"

"Uh . . . "

"Too strong for you, probably. You're like the rest, think piano music should be sweet, tinkly music: Chopin, maybe, or Debussy. That was Prokofiev, if you didn't recognize it . . . "

Leonard didn't recognize even the name, let alone the music. He saw a puff of smoke come out the exhaust of the police car, and watched it move slowly away. He knew he should wait a minute or so before leaving.

"You know," the woman was saying, "you remind me of someone . . . have you been in here before? Are you in some kind of trouble? My eyes are getting so bad . . . " Leonard was already out the door.

He started back toward the supermarket end of the center, wondering about an intersecting bus line on the other street, but saw the police car make a loop at the end of the parking lot and swing back toward him. He reversed. The woman was watching out the window of the music store; he couldn't go there. Next was the Dance Academy, its windows screened to head height with posters of ballet and jazz dance performances. "Back at two—Call Cathy if you need anything" read the scrawled notice on the door. Leonard felt the back of his neck prickle. Surely they were watching him. He dared not glance around to see where the police car was.

Martial Arts Supreme had its glass door painted red on the inside, with gold and black spiky-looking letters on the outside, and oriental characters down one edge. At some point its window had been bricked in; the new brick was pale gray, not tan. A neatly lettered sign beside the door offered classes for beginners, intermediates, and advanced in a variety of things Leonard had only heard of on television. Behind him, Leonard heard the purring of an engine coming closer. Then the abrasive squawk of a car radio turned to loud: "All units. All units. Fugitive suspect, a white male . . . " He pushed the door, half-expecting it to be locked, but it yielded to his hand. He was through the door and leaning against it as it closed when the radio outside blasted the morning with his name. " . . . Leonard Sanders, age 23, height . . . " The door shut with a final click, shutting the sound outside. He blinked.

The large room was brightly lit with three rows of overhead fixtures. Along both side walls were neatly stacked mats covered in faded gray canvas. To Leonard's left, under what had been the window, a low bench of polished wood ran the width of the room. At the far end, a panelled partition cut off the rear of the place, with a narrow hall separating several smaller rooms. Leonard stepped forward, onto a narrow rug that ran along the near wall to the first stack of mats. At once a soft gong rang in the distance. He heard a door open, and a man in pajamas appeared in the passage.

Of course they weren't pajamas. Leonard realized that in his second glance. They were those white baggy things worn by martial arts people, the ones who broke boards with their bare hands, and (in video adventures) tore up whole battalions of normally armed troops. Only then they wore black pajamas, not white ones, and had black scarves tied around their heads.

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Leonard had assumed that all—or nearly all—martial arts instructors were Oriental: Chinese or Korean or Japanese or something. That's what he'd seen on television. Also they were small. But the blunt-faced man who stood silently at the end of the room was dark, bearded, and big. Very big. Leonard swallowed. The silence stretched. Leonard could heard a faint buzzing from one of the fluorescent light fixtures. He could hear his own heart, the blood roaring in his ears. What could he say to this man—how could he explain that he'd come to the wrong place? He glanced at the bare wooden floor, the stacked mats, and finally at the dark man again. He stood, perfectly relaxed, and as solid as a tree. Leonard could not imagine him moving. Then he moved.

With the same relaxed solidity, he moved smoothly, silently. Leonard thought vaguely through his terror of waves on the shore, rising and falling in quiet power. He stopped again about ten feet away, his dark eyes holding Leonard's gaze easily. When he smiled, suddenly, mouth full of uneven teeth flashingly crowned in brilliant metal, Leonard felt his heart race even faster. Sweat slicked his back, trickled down his ribs. The man's smile faded, and he shook his head.

"I never saw anyone who needed martial arts training more," he said. His voice was warm, humorous, slightly accented. "But what are you doing here? You didn't come here to learn self-defense."

"No." Even to Leonard, his voice sounded odd and squeaky. He tried again. "No, I . . . I was eating lunch . . . I mean late breakfast. And I saw your sign . . . "

"Cops after you?" inquired the man. Leonard stared at him. How had he known? "You don't look like a thief . . . not a regular . . . " the man mused. "You sure ain't street-wise, not standing there with your pulse pounding twice normal and your sweat screaming fear at me. But a white-collar type—you get caught shorting deposits or something?"

"No!" Even frightened, Leonard couldn't stand that accusation. "No—I never took anything. Never! It's not that, it's—" And then, of course, realized what he'd said. The dark man was already nodding.

"They after you right now? 'Cause if so, I can't afford trouble, but if not, it's none of my business. I'm a neutral, if you know what that means."

"I don't know." Leonard went back to staring at the floor. "I didn't think . . . I mean, I've never . . . I don't know what they know, or where they think I am."

"Umph." Something in that grunt prompted him to go on.

"I . . . they were going to make me go to the doctor." He couldn't explain about the crabworms, the bioengineered parasites that now lived in his gut and grazed the walls for cancer cells, the tiny carcinomas that had been fatal for so many of his family. "So I left work early, before they came, and I guess they're looking for me."

"Make you go to the doctor? Are you a crazy or something?"

"I'm not crazy. It's—they want me to have an operation. They want to cut me open . . . " Leonard shuddered again

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at the thought. It was bad enough to have had to swallow the crabworm capsules, knowing what was inside the gelatin that would protect them until they were past his acidic stomach. But the thought of being cut open, having them scoured out, was terrible.

"Not crazy, but they want to cut you open?" The dark man shook his head. "That doesn't sound right. Cops don't care if someone needs an operation or not." He shrugged. "Well, did they follow you here?"

"I . . . don't think so," said Leonard carefully. "I saw a police car, and heard their radio, but they weren't looking at me . . . " The man nodded, and waved Leonard toward the bench.

"Sit down before you fall down," he said. Leonard sat, and looked up. "I'm Hank Esper," the dark man said. "I'm a black belt . . ." He paused. "Hell, you don't know what all that means, do you?" Leonard shook his head. The man sighed. "If I agreed with my teacher, I'd say your fate brought you, but I reckon neither of us believes that . . . do you?"

"I don't know." Leonard sagged on the bench. His neck hurt when he kept looking up.

"Keep your spine straight," said the dark man. Hank, thought Leonard, reminding himself. He tried to sit up straighter. His knees hurt. His shoulders hurt. Hank sighed. "I wish you *had* come for instruction," he said. "You're the worst-scared rabbit I've seen yet . . . worse than the Archer boy when his mother dragged him in . . . " He turned away, seeming to glide across the floor rather than walk. Leonard watched, unable to do anything else. Then he turned back. "You know, you're lucky you came in here. Did you try any of the other stores?"

"The music store," said Leonard. To his surprise, his voice seemed to be working well again.

Hand grinned. "Ha! What'd you think of Alicia? What'd she say?"

Leonard stared at him. "She . . . she played the piano."

Hank's eyebrows went up. "Did she, now! Something that sounded like hell warmed over?" Leonard nodded. "Must have been that Russian stuff again. You should hear her when she's warmed up. She's pretty sharp, for a lady her age. She guess you were on the run?"

"She did ask if I was in trouble, just as I left."

"I'm not surprised. She—" Hank stiffened. Before Leonard realized he'd moved, Hank had grabbed his arm and shifted him halfway across the room. "Get in there and change!" he ordered, giving a final shove that sent Leonard almost through the closed door to one of the rooms. Leonard fumbled with the doorknob, and rushed in. Behind him, he heard the solid smack of mats hitting the floor. He was in a room lined on two sides with lockers: in front of him was a clothes rack full of white pajamas, from tiny toddler-size outfits on the right to voluminous garments big enough for Hank on the left. As he tried to guess where his size would be, he heard the melodious gong again and guessed that someone had come in and stepped on the rug inside the door. He heard Hank's footsteps, then his voice.

"Hello, sergeant. Anything I can do for you today?"

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"Naw . . . keeping fit, eh? Got any strange customers this morning?"

"Not out of the usual. Looking for someone?" Leonard clawed at his shirt, got it off, and found an open locker. He pulled on one of the loose white tops quickly, then unfastened his trousers, still listening. The cop laughed.

"Well, yeah . . . sort of a crazy case. There's a court order out on this guy that was on TV last night: the one those docs were doing cancer research on. You see that?"

"That guy with the tapeworms or whatever they are?" Hank asked. Leonard started to yell out that they weren't tapeworms, they were crabworms, but he caught himself.

"That one. Seems there's this animal rights group that's got an injunction —thinks it's cruel that those whatever-they-are have to eat cancer cells—and this Sanders fellow is supposed to report to the hospital to have his removed. Only he panicked when the deputy tried to serve the papers on him and took off. Just remembered we saw someone sorta like his description half an hour ago or so—wondered if he'd stopped in here. Real little rabbit, this guy is—scared to death of everything, his doc says."

"Well . . . " There was a pause. Leonard pulled on a pair of loose white cotton pants and tied the drawstring snugly around his waist. Rabbit. That's what he was, all right . . . a scared rabbit. He felt odd and even more vulnerable in the strange white clothes. He kicked off his loafers, peeled off his socks, and tucked the socks neatly in his shoes before putting everything in the locker. His bare feet looked pale and ridiculous, toes still cramped together.

"Thought we'd look around," the cop said, with no edge in his voice but immense certainty. "Unless you want we should get a warrant . . . " That had the edge, a threat Leonard could hear easily.

"No problem," Hank said. "I do have one student right now, but he's no rabbit . . . just another out-of-shape beginner." His voice came nearer. "Ken Jones . . . he's a computer operator, I think." He rapped on the door. "Hey —Ken—you still having trouble getting that thing tied right?"

"Yeah." Leonard tried to copy that casual tone.

"Well, at least get the right color this time . . . on the last peg, remember?" On the last peg beside the clothes rack were strips of cloth of various colors, printed with strange designs. Leonard grabbed one at random, just as Hank opened the door, talking over his shoulder to the cops. "The office isn't locked, or the storeroom—go on and look. I'll be just a second . . . let me get Ken started." He pushed Leonard into the corner. "My God, Ken, you'll never get anywhere with your sash tied like that. If I were my teacher you'd be black-and-blue already." He flipped a sash around Leonard's waist and tied it with quick hands. Then he grabbed another strip of cloth from another peg Leonard hadn't seen, and wrapped it around his head. "The sweat band has to be tight enough to stay on when I flip you," he said roughly, and swung Leonard around. "Now let's go."

Leonard had a quick glimpse of two uniformed backs opening a door down the passage, and then he was tumbling onto one of the mats lying in the center

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of the floor. Quickly, Hank shoved, prodded, and pulled him into a variety of strained postures, complaining loudly that he was the stiffest, slowest, and least likely nineteen-year-old he'd ever taken on. Leonard thought of explaining that he was twenty-three, but the look in Hank's eye kept him quiet, even when he remembered that his wallet—with his IDs—was in the locker.

But the cops only glanced in that room, returning to watch as Hank urged Leonard through a stretching exercise on the mat. Already he was red-faced and out of breath. When the sergeant asked his name, his gasped "Ken . . . Jones . . . " didn't get a reaction. With a final word to Hank, the cops left. Leonard lay breathless on the mat, and waited for Hank's next suggestion. Instead, the dark man came and squatted easily on the end of the mat.

"You're that guy that was on TV? The cancer research guy?"

Leonard nodded. "They aren't tapeworms, though. They're crabworms."

Hank shrugged. "No difference to me. But that's a bum deal—didn't it say last night that you'd likely die of cancer before thirty if you didn't have those things?"

"Yeah . . . my father did." Leonard did not remember his father; he had run out on the family long before his final bout with gut cancer.

"Hmph. It's a damn shame they want to cut you up. But—" He looked around the room for a moment, then directly at Leonard. "Did it ever occur to you that you might be better off dead?"

"What? No!" Leonard managed to sit up straight, ignoring the protest of his abdominal muscles. "I—"

"Look what you are now," Hank went on. "A rabbit—that's what those cops called you—"

"I am," said Leonard, slumping again.

"Do you like it?"

"What?" Leonard couldn't quite straighten again, but he tried. "Of course not . . . but it's what I am." He'd heard it often enough. Every P.E. teacher from junior high on up had called him rabbit or worse. So had the school toughs. He'd grinned nervously and taken his lumps before they got tired of messing with him. Other targets were more interesting, were cause for pride if defeated, but Leonard was the kid all the kids could beat.

Hank looked him up and down. "What you are is a grown-up man acting like a rabbit. Are you really stupid?"

Leonard felt the heat rising in his face. "I don't . . . I don't know. Some of my teachers said I wasn't, but . . . I never did have much initiative." Initiative was for people with a future, people who would live to profit from it.

"I'll believe that. But—what are you going to do now?" Leonard said nothing, feeling the same hopeless fear he always felt. Hank leaned forward. "Going to let them cut you open and take those things out?"

"No." He didn't know how to prevent it, but he clenched himself around that decision.

"A stubborn rabbit." Hank smiled slightly. "Listen—you need muscles, rabbit, if you're going to be stubborn."

"I'm no good," muttered Leonard.

"Stop saying that. It doesn't help."

"That's what Dr. Gerson said."

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"He's right about that, anyway. So stop it. I'll give you something better to say." Hank stood, then came back down again, folding himself into something that Leonard remembered having seen on television. "Sit like this," Hank ordered. Leonard looked again and tried. His knees felt twisted sideways: his thighs ached. He didn't want to do this, but Hank was a lot bigger, and the police were outside, and . . . Hank unhooked one foot from one thigh. "Like this, then, for now. Now—I want you to straighten up . . ."

Two hours later Leonard was wondering if jail wouldn't have been easier. That's when Hank helped him into his own clothes and passed him out the back door of Martial Arts Supreme and into the back door of Lila's Dance Academy. He had heard only a little of the hissed conversation between Hank and Cathy, the senior instructor.

"You want me to what?"

"Just till my classes are over—"

"What about *my* classes? I've got all those little girls . . ."

"He's not gonna bother your little girls. He's not that kind—"

"Oh *ho!*"

"Nor that kind either. Just . . . let him do your books or something, okay?" Cathy stared at him; Leonard was too miserable to do more than stare back.

"Can you?" she asked. "Do books, I mean?"

"Yes," he said. He had, after all, hoped for that transfer to inventory, and he had made a 97 on his final in basic accounting practices last summer. So when the shrill voices discovered a *man* in Cathy's office, and demanded to know who it *was* in there, he heard her explain that it was an accountant. By then he was deep in the intricacies of Cathy's private system: she didn't trust the computer, and had a duplicate set of figures kept in an old spiral notebook. He looked up from time to time, out the window of the tiny office, to see spindly girls teetering on tiptoe. As the afternoon went on, the girls got taller and less spindly.

He expected Hank to come back, but when Cathy took a supper break (no classes from 5:30 to 7:00, she explained) she handed him over to Alicia, the music saleswoman.

"Just for supper," Cathy said severely. "Alicia will bring you back around nine." By this time Leonard could hardly move, let alone resist. He was almost too tired to be frightened—at least he hadn't thought about the police, or the jail, or the crabworms, or the cancer while Hank was folding him into impossible shapes and yelling at him to jump or twist or move *faster*. And Cathy's bookkeeping had demanded all his attention since then. Alicia's eyes twinkled behind her thick glasses.

"I thought you were in some kind of trouble," she said, leading the way along the alley behind the shopping center. "Looking out the window every second at that police car . . . and you didn't know anything about music at all."

"I do," said Leonard, stung. She was old enough to be his mother, if not his grandmother, and she walked so fast he was breathless. Whatever she had a bandage on her knee for didn't slow her down at all. "I know your door chime does that opening from Beethoven."

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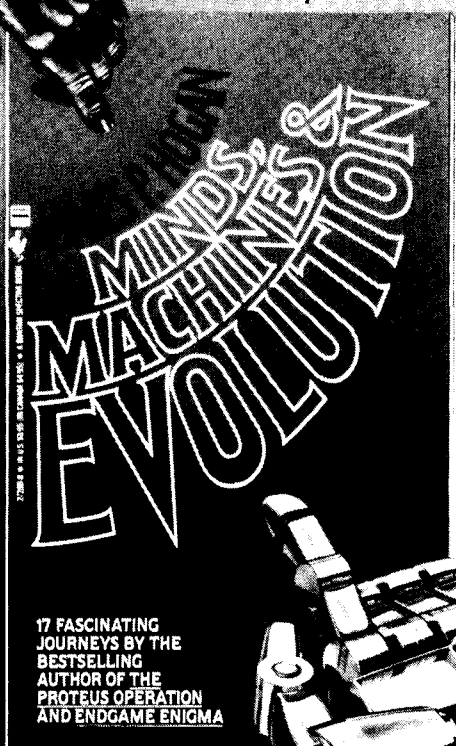
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Alicia gave him a smile over her shoulder. "That's something. Did you have that in school?" Leonard nodded at her back, unable to speak, and she went on as if he'd answered aloud. "You've probably never heard anything but those little snippets they give school kids. We'll take care of that." Leonard thought of the torture she'd inflicted on his ears in the music store and shuddered.

Alicia lived only two blocks from the shopping center, on the sort of quiet street Leonard had never seen except on television. She walked the whole way at the same fast pace, using the alleys as if they were her private paths—he supposed they were. Alicia's house had an unkempt backyard with shaggy grass, weedy flowerbeds, and an immense sycamore tree surrounded by humped and broken paving. The back door of her two-story house was shadowed under an overgrown rambler rose, long past blooming. She had her key out while Leonard was still looking around the yard, and motioned him in.

The tiny back porch was crowded with washer, dryer, sink. The kitchen, large but bare, smelled of herbs. Alicia brushed past Leonard to turn the lights on. "Go on in the front," she ordered. "In the music room." And as he hesitated in the doorway, "Left," she said. "Do you like tabouli?"

"Tabouli?" He had never heard the word, and wasn't sure if it was a style of music, a kind of embroidery, or had something to do with food. She made an exasperated noise behind him, something of a snort crossed with a sniff, and he went on through a dim hall to a large room walled with tall windows. Here a grand piano centered the room, its burnished flanks gleaming in the late afternoon light. He had never been that close to a grand piano, though he'd seen them, of course, on television. He edged close to it, almost forgetting his sore muscles and aching back in his curiosity. The top was open: he looked in to see the ranked strings. A table to one side was covered with music books, sheet music, much of it yellowed with age, but some obviously new. Bookshelves lined the inner walls of the room. A litter of books and papers covered every horizontal surface, including an old chintz-covered couch across one corner. Leonard edged along the bookcases, trying to read the titles in the fading light. He'd never heard of most of the books, and the ones he had heard of (from English classes) he'd never read. He thought only libraries had books like that, not people at home.

Alicia appeared in the hall and sniffed again. "You could turn on the lights," she said, flicking a switch. "And move some things off the couch and sit down." She gathered an armload of books, dumping them onto another stack, swept papers aside, and gestured. Leonard sat down nervously. The couch was comfortable, and he found himself leaning back into its cushions before he realized it. She had gone to the bench of the piano, and now looked back at him. "I'll give you something easier to like than Prokofiev," she said, and set her hands on the keyboard. Again he was surprised—astonished?at the sound that came out. He had no idea what she played, but the sound ravished him, struck into him almost forcibly. He could hardly remember what the piano

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in the music store had sounded like: this one seemed to contain a waterfall, chiming bells, thunder, and ribbon-like ripples of sound, cascades of sound . . . he didn't realize he was crying until he felt the tears on his face.

"Real music," Alicia said softly. She had stopped playing, but was looking through a stack of sheet music. "Real music with real power . . . and great music, like that, casts out all sorts of devils."

"Devils?" Leonard felt his stomach turn at that. Who *was* this strange woman? Did she really believe in devils? His mother had warned him that some people really did, even in this day and age: she herself wasn't superstitious, she'd told him, but those who were could cause a lot of trouble.

"Figure of speech," Alicia said, shaking her head at him. "Once people believed that all bad emotions, bad thoughts, were evil spirits inside. Even then they knew music eased sorrow and pain and anger . . . so they thought it charmed or tamed the demons. My point is that whether you call it devils or hormones, music has the power to ease the pain inside."

"Even for rabbits?" Leonard found himself asking.

"Especially for rabbits." Alicia turned again to the keyboard, and in seconds Leonard found himself swinging his foot to the beat, tapping fingers on the arm of the couch. Tired and sore and scared as he was, he felt like jumping up and following that rhythm around the room . . . or anywhere. She glanced back at him, grinning. "It works, doesn't it?"

"Yes," he said, surprised at the firmness of his own voice. "I guess it does." She played again, something cheerful and spirited, though not quite as rousing as before. Leonard relaxed. Surely nothing bad would happen within that music's spell.

Nothing bad happened, but he didn't realize he'd fallen asleep until he woke to Alicia's prodding finger. "Suppertime," she said. "You'll need it."

He was stiff, arms and legs seizing when he tried to move. She didn't say anything, and when he finally stood led him back through the archway into the kitchen. A large blue-striped bowl centered the kitchen table, a loaf of brown bread beside it. Two blue-striped plates, two fluted blue glasses, blue napkins folded in neat triangles, and—Leonard stared: was that *real* silver? It didn't look anything like his own knives and forks.

Tabouli, he discovered, looked like a disgusting mess and tasted like nothing he'd ever had in his mouth. "Mint?" he asked once, and Alicia nodded.

"And other things," she said. "Olive oil, lemon juice, any herbs you like, but always mint. You know what the grain is?"

"Rice?" he guessed. It wasn't like any rice he'd had, but that was the closest he could imagine. On the whole he liked it, to his surprise, but he wasn't sure if the crabworms would. He was supposed to stick to a defined diet, something from the lists he'd been given.

Alicia laughed. "Wheat," she said. "The same as in wheat flour for bread, but this isn't ground to flour. I learned about this from—" A bell chimed, somewhere in the house, and Alicia

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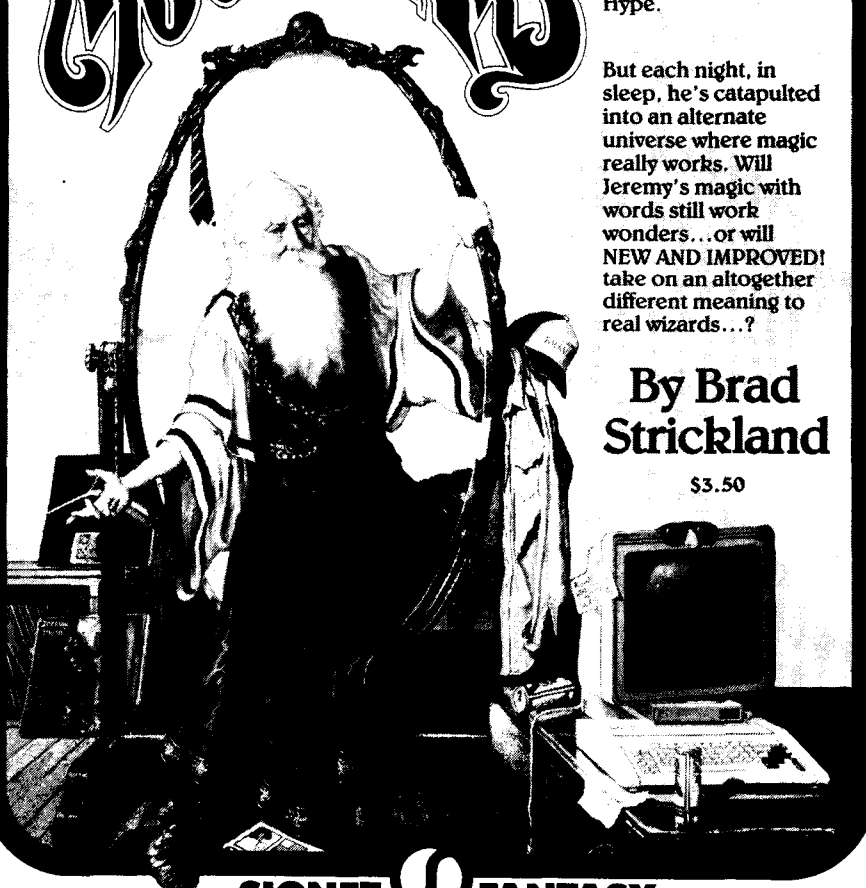

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stood quickly. "That's Hank, I hope. If not, you're . . . Ken Jones, right? Computer operator?"

"Uh . . . "

"Remember it." She bustled out of the kitchen, pulling the swing door closed behind her. Leonard couldn't hear anything from the front of the house until she pushed it open again. Hank's big frame filled the doorway behind her. He carried a big grocery sack, which he set on the white tiled counter before looking at Leonard. Then he grinned.

"You like tabouli?" he asked. "I taught Alicia to make it—and dammit, Lish, you're not supposed to eat it with ordinary bread."

"And you're not supposed to swear at me in my own kitchen," snapped Alicia, flicking her fingers at him. "I didn't have any pita, and you'd dumped your rabbit on me—"

"Sorry." Hank started unloading the sack. "Just teasing, that's all. Here's the pita . . . some olives . . . cheese."

By the end of that strange meal, Leonard had quit worrying about his crabworms. He hadn't known such flavors existed. As Hank wolfed down his own meal, and Alicia warned about the effects of Lebanese cuisine on the unaccustomed stomach, he ate until he could eat no more. Then he sat, torpid as an overfed cat, while they discussed what to do with him. Right then Leonard didn't care what anyone did with him. He felt almost as safe and comfortable as he had that morning.

"He can't stay here," said Alicia firmly. "Not that I worry about him, but everyone in the neighborhood saw him arrive, from old Mrs. Sayers to the Villegas youngsters. Someone'll have to see him leave."

"So I'll take him home with me —no—" Hank paused, eyes narrowed. "Not tonight, I can't. Well, he can stay in the office—if we're careful."

Careful, Hank explained to Leonard on their way back to the shopping center, included not flushing the john after he was left alone. "Lights can get left on by accident, but johns don't flush themselves. It's a noise you can hear all over the building, and any cop would be dumb to ignore it."

"But if I have to—"

"Then don't flush it. Just wait 'til morning. I'll be there with you for a half-hour or so anyway."

They met no one on their walk back, and only a few cars clustered around the lighted supermarket on the far end of the building. Hank led the way into the well-lighted alley, and unlocked his back door without even looking around for watchers. Leonard felt invisible eyes peering at him, and barely restrained himself from pushing past Hank to get inside, out of sight.

Hank had dragged the mat into the dressing room for him, told him which door was the john and reminded him not to flush it after he left. Leonard used it then, and made his way back to the dressing room.

"I'll be back around seven or eight," Hank said. "You be okay until then?"

"Sure," said Leonard, trying to match that casual tone. Hank nodded, and went on, flicking the light off as he shut the heavy back door.

He had never slept on the floor in his life. A mat was not a mattress, not a

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proper bed, and he found himself turning over and over, restless. It was the darkest place he'd ever been in, too. No light seeped past the red paint on the front door, and the back door was solid steel. Darkness pressed on his eyeballs, and when he blinked little wavery shapes of pale light floated across his vision.

The hours wore on. He had plenty of time to imagine what had happened after he fled from work: the contempt on Sylvia's face, the distaste on Mr. Stevens's already austere countenance. He imagined the word coming down from Administration: Sanders is fired. The obligatory green slip, the termination paycheck with its notice of the amount in his Employee's Retirement Account. He wondered what Ed thought, and who had taken over his work station. He couldn't remember if he'd bolted in the middle of a transaction. . . . and struggled with the memory until he was sure he hadn't done any harm. Beyond work, there were the doctors at the medical center. He could almost see the raised eyebrows, the pursed lips, almost hear the shocked murmurs. Sanders, do such a thing? *Leonard* Sanders? For one moment he felt almost smug about it—surprising the doctors like that—but his mood soon sagged again. He wasn't really the adventurous type, he told himself. It was one thing to swallow a capsule of bioengineered parasites, and another to be a police fugitive, with armed men searching for him. He had done just what he'd always done: taken the easy way out, run away. He was a coward, a rabbit: not a brave renegade.

Yet even as the thought made him shiver, something warmed his cold, tense feet, and he slept, waking stiff and sore, and frightened at the sound of Hank's key in the back door.

"I expect you're stiff," said Hank, before he even looked. Leonard was discovering that nothing wanted to move, and it hurt to lie still. He rolled his eyes toward the door, where Hank stood with a big brown sack that gave off a delicious aroma. "Go on," Hank said. "Get up . . . you'll get worse if you lie still." Leonard clambered up. His clothes felt strange—more comfortable, yet somehow *different*, for having been slept in.

An hour later, he was back at Cathy's desk in the dance studio. Hank had insisted on a brief workout: painful as it was, Leonard could now move his arms and legs much better. After that had come breakfast from the sack—fruit-filled pastries still warm from the oven—and a shower. Hank had brought clean clothes from his place—not his, he explained carefully, but his younger brother's—and Leonard's own clothes, with the labels carefully removed, were now on their way to a cleaner's three blocks away. Leonard felt very strange in a rust-colored shirt and a gold and green striped tie, but at least he had his own shoes. What really bothered him was the way these people were taking over his life, just as firmly as Mr. Stevens and Sylvia Goldstein. Tabouli was an improvement on frozen Salisbury steak with green peas, but was it worth it? Alicia's music . . . Cathy's smile . . . they were more pleasant than his workstation, but he felt the same dominating attitude underneath. What would happen when he wanted to do something else? Where could he run?

* * *

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When the front door crashed open, Leonard looked up to see a huge black-haired woman in a black leotard and purple wrap skirt confronting Cathy.

"You think I'm cheating you, is that it?" Her voice matched her size; it rolled through the dance studio, bounding off the walls. "You thought you could sneak in your own accountant . . ."

"That's not it, Miss Lila," said Cathy, throwing a nervous glance behind her toward the office window. Leonard hunched his shoulders, feeling the sweat break out under his arms. Another one of *this* kind!

"You didn't think anyone'd notice," Miss Lila went on. She moved, now, and Leonard noticed that she managed her heft lightly, as if she were full of helium like a balloon. She circled Cathy and came toward the office. Leonard stared at the books, unable to bolt for cover. "You think those girls never tell me anything?"

"I'm sure they do," said Cathy sharply. "But it's not what you think."

"A boyfriend?" boomed Miss Lila in the office doorway. Leonard looked up and saw the expresson on her face. 'Not a boyfriend," she said then. "An accountant." She sat down on the corner of the desk, overflowing half the papers Leonard had laid out. "Find anything crooked?" she asked. Before Leonard could answer, she had turned on Cathy again. "Girl, I thought we understood each other—if you're not happy with the deal, you can get out."

"It's not that!" Cathy slammed a pair of ballet slippers onto the other desk. "Will you listen, for once?"

"I'm listening." Miss Lila, this close, had the body of a dancer upholstered with several inches of foam: an erect back towered above Leonard's hunched shoulders, and her arms did not hang at her sides: they were poised, alive to the carefully placed fingertips. Silence held the room, thickened there, clotting in Leonard's ears. Cathy looked like someone trying out several stories in her mind, unsure which would serve. Finally she sighed.

"It has nothing to do with the school," she said finally. "I—a friend of mine was looking for somewhere to stow someone for a few days . . . "

"You?" Leonard looked up to find himself impaled by two glowing dark eyes lined in black and shadowed in purple and gray. Beneath them a wide mouth stretched. He managed a nod. "A crook?"

"No." Cathy shook her head vigorously, and Miss Lila looked away, to Leonard's relief. "He's not a crook. He's that man on TV—the one they're looking for because the medical center's in trouble. It was on the news last night—the animal rights group thinks they've broken some law about cruelty to research animals or something. Like not giving them fresh air, and clean cages and stuff. Because they have to live inside him . . . "

Again Leonard suffered Miss Lila's intense gaze. This time she rotated slowly on the corner of the desk to face him. Fascinated, he watched the smooth movement, unable to see how she could do that without any hitches or jerks. "You have those *things* in you," she said.

"Yes." Leonard's mouth had been dry; now it was full, and he swallowed.

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"Horrible things . . . they showed the pictures, the most disgusting, ugly creatures. Can they get out?"

"They're not horrible," Leonard said, almost forgetting his fear in his enthusiasm. "They're saving my life. See, I have this kind of cancer that runs in families, and if you have it—"

"Cancer," announced Miss Lila, "is a failure of faith." She moved to the other chair in the office and sat down, crossing strong ankles demurely. "If you have faith in the spiritual unity of all beings, your cells will never rebel. It's that simple"

"Miss Lila . . . " began Cathy, with a glance at Leonard.

"Oh, well, you can't expect everyone to have faith." Miss Lila shrugged, the movement flowing from shoulders to fingers in one long wave. Leonard's mouth dried again. It was so beautiful. "It takes a strong mind." She tilted her head slightly. "So you don't think those worm things are horrible, eh?"

"No . . . they're not *really* worms, you know."

"Whatever they are. So long as they can't get out."

"Oh, no."

"But—" she gave Cathy a hard look. "He *is* a fugitive, and we *do* have a responsibility to our students."

Cathy looked determined. "Miss Lila, we can't turn him in. They want to cut him open, and—"

"*Surgery!*" Miss Lila's bellow stunned Leonard's ears. "That's ridiculous. That's worse than drugs. It's faith—faith, and thinking healthy thoughts—"

"So all I did was give him a place to stay in the daytime, and tell the girls he was an accountant because it seemed the best thing . . . "

"Of course you couldn't turn him in," said Miss Lila, still quivering with indignation. "Not if they were going to violate his bodily integrity. But he's been pawing through the books . . . you don't really know anything about accounting, do you?"

"In a way," said Leonard. "I mean, I've studied it at night school. And so far everything's fine."

"Well, good," said Miss Lila. "That's that, then. But we can't have you here day after day, or the girls will be telling their mothers I have financial trouble, and the next thing you know we'll be losing students."

"I never thought of that," said Cathy.

"I realize that. And besides, they'll have seen him on TV last night—if he's here, someone will remember." She turned to Leonard. "Your name is Sanders, then? I'm Lila Courtney." She seemed poised, one arm lifted toward her ample bosom and when Leonard said nothing went on. "Are you a dance fan?"

"No . . . not really. I guess I've seen it on TV."

Miss Lila's arm sagged. "Oh. Well, I used to be quite a dancer, but if you never heard of me, you never heard of me." She heaved a vast sigh and stood. Leonard remembered distant courtesies and stood also. "I'm going to see Alicia and the girls down the row, and we'll find you something, Mr. Sanders, but not here. Just put all the papers back where you found them, okay?" She swept out, purple skirt swirling.

Cathy grinned at him. "Something,

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isn't she? Would you believe she's over fifty?"

"She's . . . " Leonard tried to think of a tactful term, and avoided looking at Cathy's skinny torso. "I thought ballerinas were all thin," he said finally. Cathy laughed.

"When she was dancing professionally, she was thin. She hated it, she told me—dieting, and all that. When she quit, she ate what she pleased and gained forty pounds in one year. But she can still do things I can't: I didn't start early enough."

Leonard started putting the papers back into Cathy's notebook, and closed down the computer. Another boss, another person making plans for him, when all he wanted was to be left alone . . . he wished Cathy would leave. He might make it out the back door. But Cathy lounged in the doorway, apparently relaxed and willing to chat. The last thing Leonard wanted was more chatting.

The door chimed. Miss Lila, Alicia, and a woman Leonard had never seen came in together. Alicia smiled and nodded; Miss Lila looked grim.

"You didn't tell me it was Hank that brought him," she began. Cathy turned red.

"You didn't ask, and I don't see why it matters. Hank happened to have him first . . . "

"I told you I don't want you hanging around with that no-good Arab and his Jap-style fighting school—"

"Lillian!" Alicia interrupted with a wave of one hand. "That's ridiculous. Just because Hank is Lebanese—"

"I even like him," said the strange woman, a slender colorless person of indeterminate age.

"It's not being Lebanese, though that's as—"

"Careful, dear," said the stranger. This time Miss Lila turned red.

"Rose, that's not what I was going to say."

"No, but it's what you were thinking. All of us Levantines, so to speak." She turned to Leonard. "I'm Rose Schwartz, by the way, from the Sunrise Christian Bookstore down the row. And before you make any rash assumptions, I'm not Christian: I'm Jewish." Leonard started to murmur polite greetings, but Rose had turned back to Miss Lila. "And you should remember, because I know he's explained it, that he doesn't fight Japanese. It's oriental martial arts, and some of them are Korean or Chinese, and the Koreans and Japanese don't like each other anyway."

"He's trouble," said Miss Lila stubbornly. "Him and that bunch he runs with, those motorcycles and all that. We run a clean business here—"

"And so does he, *here*," said Rose. "What he does over there is his business . . . the same as yours." Miss Lila turned even redder, which Leonard had not believed possible. Rose ignored that and went on. "He knows things about hiding fugitives that the rest of us have forgotten, if we ever knew them. We'll need his help."

"Not in here," said Miss Lila.

"Then in there." Rose turned to leave. Miss Lila sighed again.

"All right. In here. Cathy—"

"I'll get him."

Leonard stared at the row of faces,

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one by one. Hank and Miss Lila, two antagonistic giants, anchored the ends of the arc, carefully not looking each other in the eye. Hank wore spotless white pajamas (as they still seemed to Leonard) and a rakish glint in his eye. Cathy, lean and blonde, had left a distinct space between herself and Hank. Alicia, bright blue eyes twinkling, sat squarely on her folding chair, hands on knees. Rose clasped her hands together meekly; Leonard was not fooled. In some way she was the power here, the person to convince. She had listened to Leonard's story, then Alicia's, then Hank's, and at no point could Leonard tell what she was thinking. Now, after a long pause during which everyone stared at nothing in particular, she spoke again.

"In ten days—no, nine days, now, the injunction will expire. I saw on the news this morning that the medical center is seeking a counter-injunction to prevent Mr. Sanders's unnecessary surgery, but they don't have it yet. And besides, he's broken the law by fleeing, even if they get it . . . "

"So we keep him hidden," Hank broke in. Rose raised her hand, and he subsided.

"We can't keep him hidden forever," she said sweetly, "unless you're planning to change his identity permanently—are you?" Hank shook his head. "No, I shouldn't think so. He's hardly at risk of serious punishment, once this surgery isn't a threat any more." She looked at Leonard. "And you, Mr. Sanders—what are you planning to do when you turn yourself in or the police find you?"

Leonard couldn't answer; he wasn't sure if she meant to call the police herself, or what.

"Will you go back to your job?" she asked. "Or will they fire you?"

Leonard had not thought about his job for several hours, since Miss Lila's arrival in fact, but Rose's reminder sent his spirits plummeting. "I expect they'll fire me," he said slowly. "I did leave without permission, and they've fired others for less."

"What kind of work do you do? Are you in a union?"

Leonard shook his head. "No, I'm a shipping clerk for Stabilities, Inc. I have a terminal, you know, and just enter and delete orders, and transfer them to the right department."

"I see. Is that what you *want* to do?" Leonard stared at her, and she gazed back, her faded gray eyes showing no expression at all.

He thought, while she held the silence unbroken around him. What did he want to do? He wanted to live, first off, with no cancers eating out his guts, and no pain, and no fear of it. He wanted to . . . beyond that was a shadowy place of half-formed dreams. He wanted people to be nice to him: no more sneers and jibes from Sylvia Goldstein or Mr. Stevens. He wanted people to quit telling him what to do all the time. He wanted to make enough to live on, and maybe enough to go out now and then, and he wanted . . . he didn't really want anything at all but that. He looked again along the faces: Hank's dark, amused, dangerous glance; Cathy's bright professional smile now sobered into concern; Alicia's stubbornness clear in every line of her body, but lightened by humor; Rose's strange remoteness that

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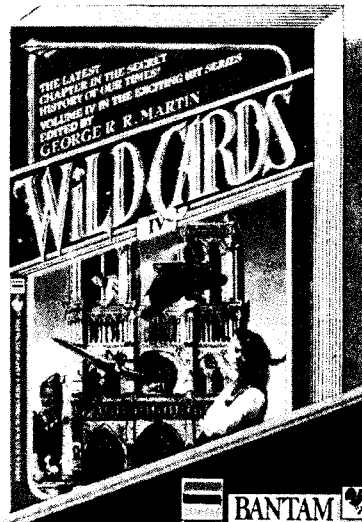

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held a strength he'd never seen before; Miss Lila's flamboyance of makeup and expression overlaying conventional propriety. He did want something else, Leonard realized. He wanted these people—these strange people, odd and frightening as they were. He wanted to stay near them, but . . . but he didn't want to be their pet, their project-of-the-week or whatever they thought he was.

There were no words for that, and he struggled with the rest of it. "I want to live," he began, miserably. "I want a job—".

"As a shipping clerk?" asked Rose, inexorably. That was the voice his junior high math teacher had used, accusing his lack of ambition.

"He can do accounting," Cathy put in. Rose glanced at her, and Cathy, like Hank, subsided. Rose let her eyebrows ascend her forehead. Leonard nodded. He would like to have said it to the teacher.

"I can do accounting. I took a course, even. I was hoping for a transfer to inventory, but now . . . "

"But you wouldn't mind an accounting job?"

"Oh, no." He was startled out of his confusion. "I'd like that." Hank stirred, and this time Rose gave him permission with an eyebrow.

"You need more than that," Hank said. "All sorts of things you need to know, like what we said yesterday." Leonard started to nod agreeably, but his stiff neck caught him. Besides . . . he didn't want martial arts training, not really. He'd rather everyone left him alone so he wouldn't need it.

"And music," Alicia put in. "He's got an ear, but no training. It's a shame for someone like that, with the ability to hear and no chance to. He ought to have a chance—"

"Chances," said Rose, in a voice that made the hair stand up on Leonard's arms. "He's had the chances anyone has—more than some—"

Hank mumbled something and she glared at him, then nodded. "I said," Hank said loudly, "that he's acting like a scared rabbit because someone told him when he was a kid that he was doomed—what else can you expect. Even me, if someone had told me from first grade I was going to die of cancer, how much time would I have spent learning to fight?"

Rose smiled, a quick twitch of her whole face that gave it color and life for a moment. "You? You'd have fought anywhere and any time—but I'll grant that it's a bad way for a child to grow. But what now?"

Everyone looked at Leonard briefly, then away. He could almost hear the gears turning in their heads, see the plans being laid out, imagine the way they would set things up for him: go here, stay with so-and-so, study this, take this job, buy these clothes . . .

"It's not your decision," he found himself saying. The heads swung toward him, astonished. Their startled silence gave him the courage to go on. "It's *my* life. My crabworms, my cancers, my gut . . . that's why I ran."

Only Rose moved; she nodded, her gray eyes warming slightly. Leonard sat up straighter, feeling the pull of sore muscles in shoulders and chest. They were listening . . . listening to *him*, almost the way the reporters had listened.

"You all helped . . . and I thank

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you . . . but I want to make plans for myself."

"But you don't have—" began Hank; Rose's gesture hushed him, and he looked down.

"I'm not big," said Leonard. "And I'm not strong, and I'm not very brave, but I can do some things. I can keep books straight, and I can—I did—decide to be a volunteer in medical research. Dr. Gerson told me that took a lot of courage, the same as climbing a mountain." He looked at all the faces again: Hank, doubting but silent; Cathy, sympathetic; Alicia, interested; Rose, approving; Miss Lila, unconvinced. "Maybe it's not the same," he went on, "but it's something. And I didn't let them catch me like they wanted to. That's something. Maybe I shouldn't have run, but I made that decision myself, and did it. If I hadn't done it, I wouldn't ever have come here. And—and I like you all, but I want to like you as a person, not a . . . a pet."

Stiff muscles and all, he was able to stand and walk to the door before the others shook themselves into action. "Thanks again," he said, and went out into the bright sunlight of the parking lot.

He made it all the way into the hospital lobby before being spotted. He always thought afterwards that it was Hank's brother's choice in clothes—not Leonard Sanders's style at all. It was Dr. Akers who recognized him, the lanky red-headed endocrinologist; she grabbed his arm and whisked him into a staff elevator before the police guard noticed.

"Where have you *been*?" she hissed. "Gerson's been hunting all over. Don't you realize how much trouble you've caused?"

Leonard felt the familiar twinge of panic, the runnels of sweat creeping down his ribs. He swallowed a mouthful of bile and said nothing. Dr. Akers finally turned away to study the level indicator as the elevator slid upward. It stopped on nineteen, opening its door onto the familiar gray-paneled lobby of the research unit's section. He followed Akers out, and across the lobby. She paused to tell a wide-eyed receptionist to keep her mouth shut, and then waved Leonard ahead of her down the hall to Gerson's office.

Through the glass panel beside the door, Leonard could see Gerson and another person in a white coat, leaning over something on Gerson's desk. Dr. Akers leaned past him to knock at the door and push it open quickly. Gerson looked up.

"Hi, Ann, we were—my God, it's Lennie!" Gerson's tufted gray eyebrows shot up the slope of his brow. He looked more startled than angry. "Where did you come from? Did you see the latest newsbreak?"

Leonard shook his head. "No, sir. I—I just thought I should come in . . . "

"I'm glad you did. I—Ann, Pete, if you'll excuse me, I think Lennie and I need to have a talk . . . "

"Sure." The other man, someone Leonard had seen around the hospital but never met, turned to go, snagging Dr. Akers as he went. Gerson moved around behind his desk, and waved Leonard to the comfortable chair beside it.

"Lennie, I understand you were

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frightened and upset, but I wish you'd come here first . . . ''

Leonard felt his determination wavering. Dr. Gerson had been so thoughtful, all along, and so encouraging. But a remnant of the strange mood he'd felt the night before in the Martial Arts Supreme storeroom stayed with him. ''I don't want anyone to cut me open,'' he said.

''There's no question of that,'' said Gerson smoothly. ''A court can't make you submit to surgery when you haven't committed any crime. It would have been easier if you hadn't run from the police, but . . .''

''I didn't exactly run from the police,'' said Leonard. ''I just left the office . . . the police hadn't arrived. So I wasn't ever charged with anything, or arrested . . . ''

''Yes, but—'' Gerson chewed his lip a moment. ''Look, Lennie: they know I called you to tell you about the summons . . . so they assume you ran away to avoid it. Now that's illegal—trying to avoid a legal summons. And they put it on the news—''

''I didn't watch the news.'' All his stubbornness had returned in force. ''It's not against the law to not watch the news for one night.''

''No. It's not.'' Gerson sighed. ''Lennie . . . I've got to tell the court where you are. I'll be compounding the crime if I don't.''

''I know that.'' Leonard looked up, meeting Gerson's gaze squarely. ''I know you have to tell them, and maybe I have to go to jail. But I wanted to see you first, and tell you something. I won't agree to having an operation, and I won't agree to give up my crabworms. And if they try to make me do it, I want you to help stop them.''

''You could have another dose later . . . ''

''No.'' Leonard shook his head, not even wincing at the pain in his stiff neck. ''They might not let you give me another dose. I won't take that chance. My crabworms are eating up my cancer cells—you proved that—and I don't want to die.''

Gerson sighed again. ''I know. I know, and you're right. It would be easier if you just . . . but I guess if it were my gut, I wouldn't either. Okay, Lennie . . . we'll see what we can do, and I promise you I'll stand between you and the knife. Right?''

''Right.'' Leonard sat still, astonished at himself, while Gerson put in the call to the hospital legal department. He had actually done it. He had actually made it back to the hospital on his own, and talked to Gerson, and Gerson had listened to him. Listened to him almost as if he were worth listening to. He listened to Gerson explaining that Leonard had come to the hospital on his own, and was ready to come into court when called. When he finally put the phone down, he was shaking his head slowly.

''You have to stay here, they said, and they'll send someone over around three. There'll be a hearing. You heard me say we'd post bond for you . . . '' Leonard hadn't heard it, really, but he nodded. ''I think—if you don't mind my giving advice—that if you tell the judge you were afraid of your cancer erupting, and that's why you ran, she may be lenient.''

''She?'' Leonard still thought of judges

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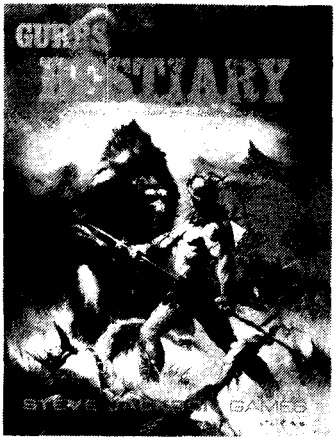

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as gray-haired serious men in long black robes. That's what he saw on television.

"Judge Lane. Our lawyers got the case transferred from Pearson's court; he was obviously prejudiced, and we could prove it. Anyway. I'll have lunch sent up. Our lawyer will be here in a few minutes." Gerson leaned back in his chair. "Do you want me to call your office, let them know you're all right?"

"No." He had thought about the office all the way to the hospital, to keep himself from thinking about the police. "I don't want to go back there. I want to find another job."

"Hmmm. Any idea what?"

"Accountant," said Leonard. "I took a course . . . "

"Do you want to work here, in the medical center?"

"I—hadn't thought about it. Are there jobs?"

"I don't know. Have to check. But there might be."

The court was unimpressive compared to the sets on television dramas. The judge's desk ("bench," explained the lawyer) sat on a raised dais; the tables for counsel were plain, and the seating behind was only cramped folding chairs. The hospital lawyer, a large pink man with silver hair in a careful wave, nudged Leonard to his feet when Judge Lane came in. She looked, to Leonard, like someone who should have had five children clustered around her: a comfortable, middle-aged woman with an expressive mouth and bright eyes. Alicia would like her, he thought to himself, and wondered if she lived anywhere near the Crestview Music Store.

"Mr. Leonard Sanders," she said, and Leonard stepped forward before the lawyer could nudge again. She had that sort of voice.

"Yes sir . . . I mean, ma'am."

She smiled briefly. "Your Honor is the usual form of address. You are aware, Mr. Sanders, that you have broken the law by running away when a summons was being served?"

"They explained it to me," Leonard said.

"Who?"

"The lawyer at the hospital," Leonard said. "He said it was against the law to run like I did."

"You didn't know that before?" Her voice held polite disbelief.

"No . . . I mean, I knew I shouldn't, but not that it was against the law, when I hadn't broken a law. If I stole something, and then ran away, it would be different."

"I see." She looked down at papers on her desk, and then back at him. "The law, Mr. Sanders, is quite specific on this. Evading the officers sent to summon you to court—intentionally evading them—is against the law, and constitutes contempt of court. Now I understand you didn't actually see the officers coming, is that right?"

"Yes, Your Honor."

"But you knew about them . . . "

"Yes, I did. Dr. Gerson called me to say they were coming to take out my crabworms, and—"

"You thought the officers would do that?"

"No . . . I meant, he said that's why I had to come with them, and they'd take me to jail, and then to the hospital . . . "

"To jail!" Judge Lane leaned for-

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ward. "Mr. Sanders, did you seriously think that a summons to appear in court was the same thing as an arrest?"

"Isn't it?"

Her gaze stabbed beyond him. "Why didn't you tell him the truth?" she asked Gerson, obviously angry.

"I hung up," said Leonard quickly, before Gerson could answer. "He tried to say something more, and I just hung up and bolted . . . "

"Is that true?" she asked.

"Yes," said Gerson. "I was trying to reassure him and explain what would happen, when the connection blanked. I thought maybe he'd fainted, or dropped the phone, and called back. They told me he'd suddenly run out of the room."

"You should have been more careful," she said, then looked back at Leonard. "How old are you, Mr. Sanders?"

"Twenty-three."

"And I already know you have no record . . . have you ever been in court before?"

"No, Your Honor."

"Hmmph. All right. Let's get the rest of this cleared up, and then I'll see about your contempt citation."

The opposing attorneys, nearly identical in their dark suits, started to unpack several briefcases, but the judge stopped them.

"Gentlemen, I've read your material already, and this is only a preliminary hearing on the validity of the original injunction and the request for counter-injunction filed by the medical center. The question here is whether the organisms presently residing in Mr. Sanders's digestive tract need to be removed for safekeeping until the matter of the applicability of the Animal Rights Act comes up. According to briefs submitted by the medical center, Mr. Sanders requires these organisms in his intestine to destroy cancerous tissue and sustain life. These organisms were designed to live in the human gut, and cannot easily be maintained except in this environment. They are safe where they are, and Mr. Sanders is safe where they are, and I need a fairly compelling legal reason to order their removal."

"But how do we *know* they'll be there when the main trial comes?" asked the taller attorney. "They could flush them out and we'd have nothing . . . "

"It's an inhumane environment," added the other. "Confined in darkness, without fresh air or freedom of movement . . . "

The hospital's attorney bounced to his feet and was recognized. "Your Honor," he began, "many organisms have their natural habitat in the human gut. This one, though not originally found there, is designed for it. And we can certainly agree to keeping the organisms there until such time as the matter comes to trial, if that happens. We have no intention of removing them; it would be dangerous for Mr. Sanders, and probably fatal to the organisms themselves."

The opposing attorneys both stood, and the judge recognized the taller one again. "It is ridiculous to allow someone charged with maltreatment of an organism to retain control over it. We feel that unless the organisms are under court supervision, there's an excellent chance they will not survive to the later trial. The defendants have every reason to get rid of them—"

"I do not!" said Leonard. Dr. Gerson

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hastily pulled him down as the judge banged her gavel.

"Mr. Sanders, you are stretching my sympathy to the limit," she said. "You are not to speak unless called on—is that clear?"

"Yes, ma'am," he mumbled.

She turned to the opposing attorneys. "If the court should order the organisms removed from Mr. Sanders's gut, just exactly how would you think they should be cared for?"

"Well . . . in a laboratory, under proper supervision—which must, Your Honor, include supervision by either the court or by our representatives. Given plenty of light, fresh air, the appropriate food . . . "

She looked back at the hospital's attorney. "And you say this would be impossible? Can you explain?"

Leonard, watching her as the hospital's attorney stood to speak, had the feeling that she already understood both sides as well as he did, if not better—she had her own reasons for making them go through it all. The hospital's lawyer was going through it carefully, in detail, but without a trace of patronization in his tone. The organisms' requirements, which included no oxygen, no light, a diet rich in certain fatty acids and not others . . .

"—in other words," the judge broke in smoothly, "they must live in someone's gut?"

"It is *possible* to maintain them in the laboratory," said the lawyer, "but very difficult." The judge turned to the opposing side.

"You gentlemen have the right kind of environment for these things?"

"Well, I'm sure we can arrange something, Your Honor," began one, but the judge waved him to silence.

"When I give custody of an abused animal—a horse, say—to someone other than the owner, I make sure that person has adequate facilities. Your initial argument suggests that you do not, in fact, have facilities for this organism —unless one of you was planning to volunteer?"

"Volunteer, Your Honor?"

"To let them live in *your* innards," said the judge sweetly. "I don't know how it could be arranged, but that would insure that they would be under the supervision of your society, wouldn't it?"

The attorneys had turned several interesting colors, ending in greenish gray. "But—" one of them managed to gasp.

"I thought not." Judge Lane smiled. It was not a friendly smile. "You want to subject an adult citizen to exploratory surgery to recover intestinal organisms which you supposedly want to protect—but you have no place to keep them and care for them properly, and you aren't about to volunteer to use your own bodies as a receptacle—is that true?"

"Well, no. But we—"

"Let me put it this way." She leaned forward. "I will not agree to putting these organisms anywhere but in a human gut. As far as I'm concerned, Mr. Sanders's gut is simplest. Mr. Sanders has reason to keep his organisms alive and healthy: they're keeping *him* alive and healthy. I don't think he's going to kill them off just to spite your organization. But if you're willing to volunteer your own, I might consider a motion to transfer at least some of the contents of

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Mr. Snaders's gut to your gut. Not a hired gut, you understand—yours."

A brief muttered conversation, during which the two opposing attorneys scowled at each other, glared at each other, and finally faced the judge with expressions of anger tempered with caution.

"Your Honor," said the short one, "if the court is prepared to require Mr. Sanders to swear to produce these organisms later, if required . . . "

"Fine," said the judge. She nodded at Leonard. "Mr. Sanders—come up here."

Leonard got to his feet, and made his way to the bench.

"Mr. Sanders, you have said that you think the organisms in your intestinal tract are all that keep you alive: is that right?"

"Yes, Your Honor."

"And you will adhere to whatever medical regimen is required to keep those organisms in good health until this matter is finally decided?"

"Yes, Your Honor." Leonard's gut rumbled; he saw the corner of the judge's mouth twitch. It was the tabouli, he thought to himself, and he'd have to ask Dr. Gerson what all that strange food might have done to the crabworms.

"And you will present yourself in court, when summoned, without any shenanigans of the sort you pulled this time?"

"You mean when I ran?"

"Yes, when you ran. I want you to swear that you will appear, without having to be chased all over the city, whenever the court requires."

"Yes, Your Honor. I will."

Judge Lane looked up at the others. "I need to speak to Mr. Sanders on the matter of his contempt of court. Court is adjourned; Mr. Sanders, come to my chambers." Leonard cast a frantic glance toward Gerson and the hospital's attorney, but both of them shook their heads, and made pushing motions: he had to go. Nervously, sweating already, Leonard followed the judge to her office next door to the courtroom, a small, cluttered room with one bookcase and a desk overflowing with papers and books. A notebook-size computer lay open on her desk.

"Sit down," said Judge Lane. She was already in her own chair behind the desk, flipping the sleeves of her judicial robe out of her way. Leonard sat on the edge of the other chair. "I asked your employers about you," she said, as she flicked the computer on. Her fingers danced across the keys; she looked over the top of the display at him. "They said you were unstable, immature, and unsuitable for reemployment."

"Reemployment?" Leonard repeated the word mechanically, almost without thinking.

"Yes. My clerk was told they'd fired you, and when I pointed out that this was a violation of the Fair Employment Practices Act, and that all you had done was evade a summons to be a witness—that you had not been charged with anything—they said they'd assumed you were quitting when you left. Your final paycheck is supposed to be in the mail."

"Already?" Leonard had been sure they'd fire him, but he'd thought someone would do it when he came back, in person.

"Already. Do you know a Sylvia

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Goldstein?" Leonard nodded. "And a Mr. Stevens?" Another nod. "Poisonous, those two. If you'd been charged with a felony, they couldn't have been more eager to see you gone. I think you probably have a case against them, under the Act, but it would cost a lot to pursue it, and I doubt you'd find it a pleasant place to work after all this."

"It wasn't pleasant before," said Leonard, surprising himself.

"*Are* you unstable, immature, and so forth?"

Leonard looked at her. Another Alicia, or Rose, or maybe even Hank . . . he tried to sort out his thoughts. "I . . . I was always afraid of the cancers," he said. "I mean, my father died, and my mother had lung cancer and died, and she'd told me I would. So it never seemed worthwhile to try for anything big. I wasn't that smart, or talented, or anything. But after Dr. Gerson picked me for the research . . . " He paused, remembering that first faint glow of self-esteem, the day Gerson had signed him as a research subject. "I did have something," he went on. "They needed me; they said I could help a lot of people by helping them. And they started talking to me—" He told the judge about the people he'd met at the medical center: their encouragement when he mentioned taking a night class in accounting, their friendly questions.

"I knew it wasn't really a friendship," he said. "I mean, I'd never try to go to Dr. Gerson's house or anything like that. But they were just—just nice to me. Cindy, in the lab, the one who did my tissue samples, and Bill, in the animal labs, where they keep the guinea pigs . . . they'd tell me about their work, and their families. It made me feel good. At work, it was all 'Lennie, do this' and 'Lennie, do that'; no one cared. Anyway, I took the course, and passed it—" He remembered the brighter glow when he got his first exam back, with "Excellent" scrawled on the top. And making an A on the final. He told the judge all this, and finished up with—

"But I never had a girlfriend, or anything, and I'm still scared a lot. I've always tried to do what they told me to—"

"They?"

"Anyone like teachers, or my boss. That's why—" He stopped again, watching her face. She looked a *lot* like Alicia. "I guess—I mean I *know* I was wrong, to run away, but—but it was one time I just did something myself. Without asking anyone, all on my own. I went places I've never been—"

"I was going to ask you about that. Would you tell me where you were, and what you did?"

"I—I guess. Will it get them in trouble?"

The judge's eyes twinkled. "You don't have to tell me any names, you know."

"I hadn't thought of that." Leonard took a breath and plunged in, telling her everything from Gerson's phone call on: the janitor in the service elevator, the rude bus driver, the patrol car at the supermarket parking lot, his adventures in the shopping center (without names) and his sudden decision to turn himself in. "I just realized I could do things," he said finally. "Dr. Gerson had told me that before, but it came clear suddenly. I think maybe because my neck hurts."

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"Hmmm." Judge Lane was tapping on the keyboard again. "So you aren't sorry you ran away? Even though it was a crime?"

Leonard felt sweat prickle his neck again. "I'm sorry I ran . . . I mean, I'm sorry I wanted to run, that I was that scared, but I'm not sorry I did something *myself*."

"Suppose it did get those people in trouble—would you be sorry about that?"

"Oh, yes. They didn't mean to do any harm; they just tried to help me. They're *nice* people."

"I see. So what you're saying is that you wish you hadn't been so frightened, but you feel just a little proud of yourself for doing something—even something wrong—on your own. Is that it?"

"I think so. Yes. I know you have to punish me for doing wrong, but—" Leonard's gut rumbled again, comfortably, and he laid his hand against it. "I'm really somebody now. I'm not going to die—at least, not from the cancers—and I can plan things, and do things, and—"

"All right, Mr. Sanders. Let's get this straightened out. You admit that you ran away from the court's summons, and you knew it was wrong. I'm still not sure you had the right idea of what the summons meant, but that's not the main point here. The point is that you did something wrong, and you knew it was wrong. On the other hand, you thought the court order might result in your death, and you have a disease which made that fear reasonable, or at least understandable, and you're very young and inexperienced in the world. Now. The law is quite firm on what constitutes contempt of court, and what you did qualifies; you were ruled in contempt of court, in fact, before you appeared. But you turned yourself in, and you have a convincing explanation of your actions. Also, you've lost your job over this. I'm going to consider that a lost job is ample punishment for your panic, but—" She leaned forward, her face now serious. "You're going to have to grow up, Mr. Sanders, and learn to make good decisions for yourself. Fear of death is an excuse—a powerful one, but not compelling—for blind panic. Dr. Gerson thinks you can do better—and from what you tell me, so do you. And I think you owe those people who took you in an apology for risking their legal standing, and a better explanation than you probably gave them. I want you to promise me that you will go back there and talk to them. Will you?"

"Yes, Your Honor," said Leonard, his heart thudding painfully.

"Soon," she said, her eyes dropping to the computer display. "I'll want you to let me know when you've done it."

"Yes, Your Honor."

"Then you may go. I've entered it on your record as 'dismissed for extenuating circumstance,' which is the best I can do."

With his first paycheck from his new job, Leonard filled two grocery sacks with pita, ground lamb, fresh vegetables, and a wine recommended by the delicatessen owner ("A party for who?" he'd asked. Leonard had explained, in some detail, and the man had shaken his head, but helped anyway.) He lugged them aboard a crosstown bus, having

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had to look up the route (two transfers) to the shopping center. When the bus finally curtsied to a halt in front of it, Leonard managed to get down the steps without spilling anything out of the bags. It was just after noon on a Saturday; more cars were in the parking lot than he'd seen before. A patrol car was stopped, lights flashing, at the far end of the parking lot where a crowd had gathered. Leonard glanced at it, and felt no fear. Whatever had happened was no threat to him. He headed for the strip of stores.

Through the smeared glass of the window, he saw Alicia talking to a pair of gray-haired women by the music display racks. He hitched the sacks up in his arm and wandered down to the dance studio, just as a raft of giggling pre-teen girls in baggy leg-warmers converged on the door. A minivan pulled up and disgorged an even shriller group. Another hitch of the sacks, and he headed for the Martial Arts Supreme. But here a group of older boys lounged against the door, occasionally feinting kicks at each other, hooting with glee. Leonard thought of pushing through them, and going inside, but it was probably busy in there, too.

That left the bookstore. He hadn't been inside before. He looked past the window display of books with glowing rainbows or praying hands on the covers, and saw Rose sitting at a counter, reading something. He couldn't imagine her reading anything that would have a rainbow on the cover.

When he leaned on the door, it opened slowly. Over his head a chime jangled. Rose looked up. Her expression did not change, but her eyes seemed to flicker.

"Ah . . . " she said softly. "Is it—?"

"Leonard Sanders," he said.

"You're not really a rabbit," she said, as if to continue the conversation of weeks past.

"No," he said. "Not any more." He set the sacks down on her counter.

"Did you get in a lot of trouble?"

"Not as much as I'd been afraid of." He took a breath, and faced her eyes, the challenging eyes of someone who has seen worse than this. "I shouldn't have run—but since I did run, I'm glad I ran here."

"I'm glad you stopped running," she said gravely. "And I'm glad you came back to tell us about it. We were worried."

"I know. It helped." He grinned at her. "I—I wanted to give a party, but my place isn't big enough."

"I think we can find a place," she said. Now her face was changing, into that warmth he had glimpsed once before. "Just let me call the others." She turned to the phone, then glanced back at him. "You realize we'll try again—to run your life for you, I mean. We're like that, when we care."

"I know," said Leonard. "I won't let you."

"Good." She winked at him, and started dialing. ■

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Jay Kay Klein's biolog

As you may guess, SF authors can write long, interesting letters. A letter from Elizabeth N. Moon is akin to a page from a diary, like something out of *Daddy Long Legs*, complete with little explanatory sketches.

Though she hasn't been writing SF for long, Elizabeth had a great deal of experience with sentient beings of wildly differing thought patterns. She was born and raised in Texas, 250 miles south of San Antonio, where refugees slipped over the border just eight miles away. She heard the life stories of people from Russia, Latvia, Czechoslovakia, the British West Indies, Armenia, and other locales far removed from the Lower Rio Grande Valley. She was apt to attend services at a synagogue, Catholic church, or one of another six different faiths.

The melange of languages didn't stick permanently, but she did study French, Latin, German, and classic Greek. With a mother busy working as a draftsman, she learned early to care for herself —though her childhood dream of being a rocket test pilot, owning a ranch overrun with horses, and having 25 children never did come true. At school, she was told a girl shouldn't beat boys at racing no matter how well she ran, and was counseled to deliberately make poor grades in math and science. Despite all this, she won the Bausch and Lomb Science Award for her high school, mortifying everyone.

Elizabeth didn't discover SF until the seventh grade. Then, she had to fight for one of only two copies of *Analog* at the grocery store each month. At Rice University in Houston, she ran into calculus and decided against a physics major in favor of ancient and medieval history. Three years in the Marine Corps were devoted to computer programming. She then took a degree in biology at the University of Texas in Austin, while her husband earned his M.D. When he became a country doctor, she became a volunteer ambulance EMT/paramedic.

Now, you have to understand that Elizabeth's life is sort of like a van Vogt *Analog* story, with intricate subplots. With everything else ticking away, she audited a creative writing class at Southwestern University. The teacher encouraged her, and she sold some stories and articles before Dr. Schmidt bought "ABCs in Zero G," about a paramedic in space for the August, 1986 issue.

Meanwhile, she's been on the city council of Florence, TX (pop. 799), president of the chamber of commerce, and on the library board. She fights local politics six days a week and directs the Grace Episcopal Church choir on the seventh. The rest of her time is devoted partly to a child and several interesting hobbies. And in case you're wondering, yes, all of this diverse input has worked to her benefit as a writer. Surely there will be a place where a story character built a boat in the living room, or constructed a chicken coop upside down, or hiked across Zion National Park, or played the accordion for the German Club, or delivered a baby over the telephone. For Elizabeth Moon, improbabilities are probable. ■

Elizabeth N. Moon

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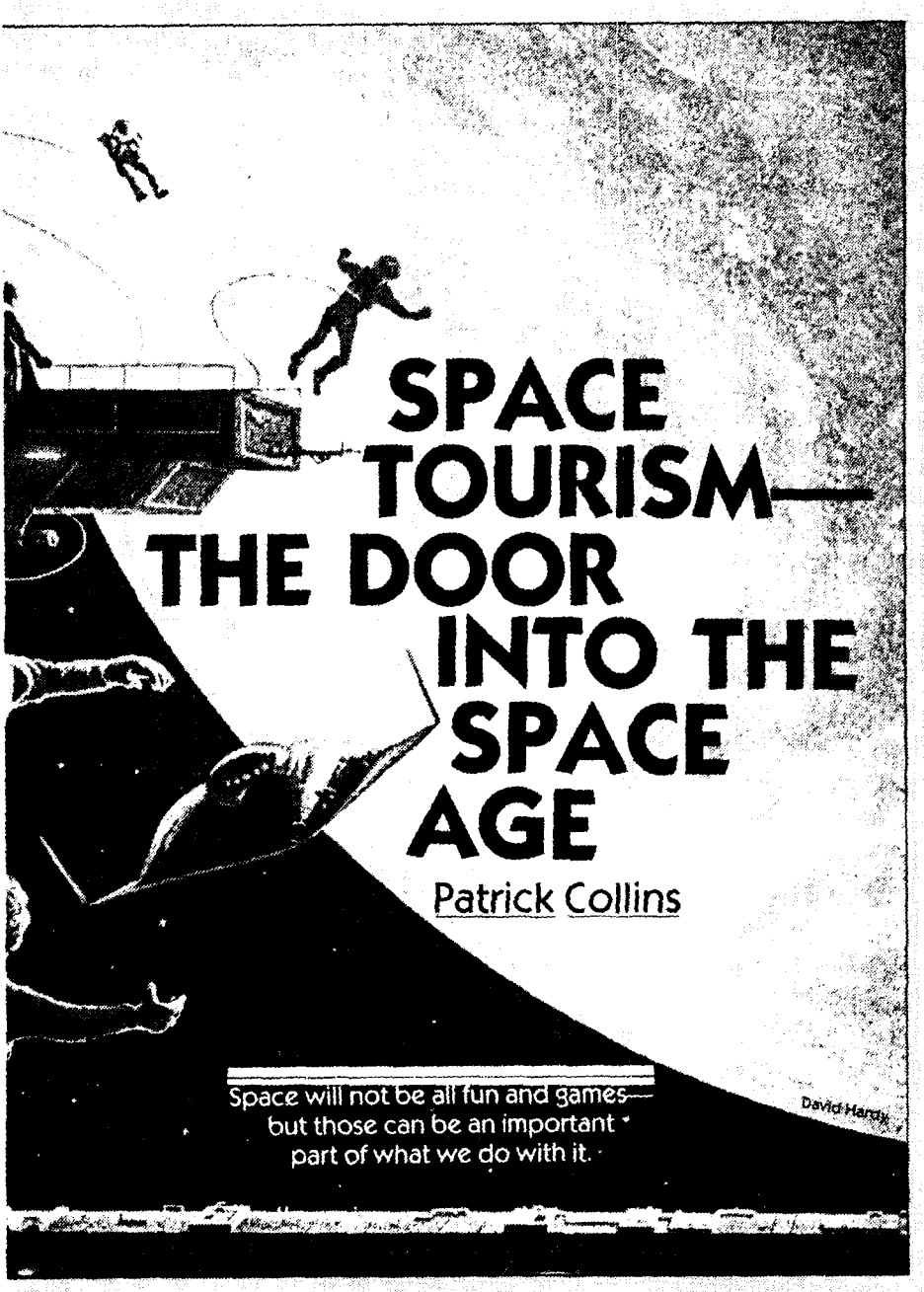
SPACE TOURISM— THE DOOR INTO THE SPACE AGE
Patrick Collins
Space will not be all fun and games— but those can be an important part of what we do with it.
David Hardy

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The idea of tourism in space plays a part in several well-known science fiction stories: Robert Heinlein's 1957 story "The Menace from Earth" is about a rich tourist learning to fly in a large canyon on the Moon which has been covered over and filled with air for recreational flying—a realistic possibility for the 21st century. Arthur Clarke's 1961 novel *A Fall of Moondust* concerns the misadventure of a party of lunar tourists, while Joanna Russ's 1968 novel *Picnic on Paradise*, set much further into the future when interstellar travel is common, concerns a party of tourists who get caught up in a civil war while visiting a distant planet. More recently, "Galactic Tours," by David Hardy and Bob Shaw, illustrates a whole range of tourist possibilities, from skiing on Europa (one of the moons of Jupiter) in our solar system, to weird and exotic possibilities in other star systems. And one day humans *will* go skiing on Europa—at least a few early explorers will within the 21st century. Most recently, Ben Bova devoted several pages of his "Moonbase Orientation Manual" (Part II, July 1987 *Analog*) to tourism on the moon 50 years from now. With continuing world economic growth, the longer term prospects for space tourism are clearly limitless.

However, the *beginnings* of space tourism will be very much nearer home, quite literally, for the first destination will be a mere 200 miles away—in low Earth orbit. And although less exotic than the longer term prospects, visits to nearby space will be hardly less attractive. Despite the seriousness of their training, and their tight work schedules when in orbit, everyone who has experienced it agrees that space travel is *fun*. Sally Ride, the first English-speaking woman astronaut, summed it up when she said of her first flight in the Space Shuttle: "It was great fun . . . and I guess it will be the greatest fun I ever have." U.S. Senator Jake Garn even wangled himself a flight. Irrespective of any scientific or political value that their flights may have had, none of the astronauts would have missed them for *anything*.

More than being fun, a visit to low Earth orbit is also *fascinating*. The absence of gravity introduces novelties into every activity, making the experience endlessly interesting. Washing, dressing, eating meals and other ordinary activities are all transformed in zero gravity. Even just moving around is so different that the Skylab astronauts reported that they could never resist making acrobatic movements, somersaults, spins and so on, when they had to move some distance. In addition to this, the view of Earth from low orbit is literally breathtaking, both by night when the globe flickers with lightning storms and polar aurorae, and by day when the ever changing terrain below is dazzlingly clear. Photographs and films of the view are beautiful, but to experience it for real is apparently stunning. Astronauts in Skylab spent *hours* on end watching the Earth through the porthole whenever possible. The absence of air also, of course, provides perfect conditions for observing the Moon, Sun, planets, stars and nebulae.

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Even more than this, however, and perhaps most importantly for anyone (including many science fiction readers) with some feeling for the *immense* future stretching ahead of the human race, as we explore in turn the solar system, the nearby stars, the whole milky way galaxy (and eventually of course, even other galaxies), these first tiny steps above the Earth's surface have extraordinary evolutionary significance. To visit low Earth orbit at this point in history is to feel yourself as part of our species just peeping out into space, as the first protoamphibians must have peeped out of the prehistoric seas at the land covered in primitive plants. As such, the experience of seeing the sky darken into the blackness of space as you climb above the Earth's atmosphere carries such emotions of excitement, awe and inspiration that for many people a trip to orbit will be an absolute *must*, an almost magical event, a once-in-a-lifetime, modern day pilgrimage.

Even for those not lucky enough to have this perspective, a visit to low Earth orbit will nevertheless be uniquely entertaining—and the public already understands this. Astronauts have been children's heroes for decades (despite their limited activities since the Apollo program), while a recent survey carried out for the American Express company in the UK found that more than 50% of those under 45 years old, and more than 60% of those under 25 would like a holiday in space if it was available. Even the most experienced traveler who has "been everywhere," from the Caspian Sea to Jamaica, from the Taj Mahal to Alaska, has never done anything remotely like taking a holiday in space.

However, although these early space tourist services will clearly become available long before more exotic services such as trips to the Moon, many of you may feel that even trips to low Earth orbit are not going to be available on a commercial basis within your lifetimes. This, I claim, is *wrong*, and much of the rest of this article will argue the case that it is feasible for space tourism to begin *this century* (yes, during the 1990s); and that once it starts it will grow rapidly and the price will fall so that within 20 years, although still expensive, orbital trips will become widely available for people prepared to save their holiday budget for a few years.

The key, of course, is to bring the costs down within customers' reach, and unfortunately the U.S. Space Shuttle is a step in the wrong direction: Due to the conflicting political requirements placed on its design, it costs *more* to launch a ton of payload than the expendable Saturn V of the 1960s! However, there are two design approaches for reusable launch vehicles using existing technology which could bring down the cost of a short trip into space low enough to establish a profitable industry (see below). Nevertheless, in order to reduce costs sufficiently, the turnover of passengers must be high enough to gain the maximum economies of scale—which will depend both on the price and on the popularity of what is being offered. And I believe that when it becomes commercially available, the possibility of paying a short visit to a

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"hotel" in low Earth orbit will be extremely popular, even at a price of thousands of dollars, because of the unique range and variety of entertainments that will be available.

Zero Gravity Entertainments

In addition to the extraordinary views to be had from an assortment of portholes, panoramic windows, viewing domes and observatories, holidays in orbiting "hotels" will provide *zero gravity*. Among other activities, this provides the opportunity for human-powered flight in large gymnasiums, using fabric wings attached to the arms and tails attached to the ankles. Just *learning* to fly will be fascinating in itself, but flying will also provide further scope for many new leisure and sports activities—racing, aerobatics, chase games, dancing. For those interested in the details, flying in zero gravity will not be the same as flying on Earth since there will be no need to generate lift: objects continue moving in a straight line unless they experience an external force. However, wings and tail will be needed for propulsion, steering and stopping—so having accelerated to the speed you want by flapping your wings, turning, swooping and coming to a stop will be much like that of a bird. For instance, altering the angle of attack of one or both wings will allow you to roll, climb and dive at will, while raising your tail segments (attached to your ankles) will tip your body "down" perpendicular to your flight direction, and flapping your wings from back to front (while keeping your balance!) will bring you to a halt. There's clearly plenty to learn!

Zero gravity water sports in a large, gymnasium-sized room will also offer many new experiences. The behavior of water in zero gravity is dominated by surface tension, and a swimming-pool sized "piece" of water could be broken up into dozens of different sized "pieces" offering different attractions: It would be possible to dive right through large pieces and emerge from the other side, while swimming would have the novelty that bodies at the surface would float very high, whereas "underwater" you would not rise to the surface spontaneously. (For safety, people may wear small bottles of compressed air with a mouthpiece to allow them to breathe when underwater.) Armfuls of water could also be thrown as a means of propelling yourself around the room, while smaller pieces the size of tennis balls would be as handy as snowballs! A room containing many "pieces" of water would provide an interesting environment for hiding and chasing games. A large, slowly rotating, cylindrical swimming chamber would also enable people to swim around the inside curve in low pseudo-gravity for exercise, as well as to dive out and float in the central air-space.

Zero gravity also provides extraordinary scope for completely new ball games, chase games and games of skill. Acrobatics would become a different, more leisurely, high precision art-form. The use of simple air thruster packs would allow people to maneuver in three dimensions without effort, or to "dog-

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fight'' with each other. Just learning to make gentle, controlled movements while preserving your balance will be interesting, and sleeping with a partner will have its novelty, for instance in ''rendez-vous and docking,'' as well as its advantage—no more arms going to sleep! The list of enjoyable uses of zero *g* is as long as your imagination.

For those wanting less energetic pursuits (or those temporarily exhausted) zero gravity also offers fascinating possibilities for demonstrating physical phenomena not possible on Earth. Water and other liquids behave quite differently: they can be formed into ''ropes'' or rotating donuts, or expanded with bubbles that don't rise to the surface and burst. This would make it possible to bake ''ultralight'' cakes or to make objects out of metal ''foam,'' while the unconstrained behavior of magnetic materials and spinning objects can also be shown in zero *g*. Again, the possibilities are endless.

On a different note, orbiting botanical gardens would hold enormous interest as they revealed the exotic ways in which different plants adapted to a zero gravity environment. Many will grow much larger than they do in the 1 *g* gravity field on Earth, and they will grow in much weirder ways without the gravity vector to guide them. A 3-D ramble through a zero *g* hanging jungle, complete with ''waterfalls'' and pools, will be a possibility at a later stage! It is easy to get carried away musing on the delightful possibilities that are going to be available one day, but we must come back to Earth if we are to seriously consider how soon these ideas may be feasible.

Prospects for Near-Term Space Tourism

There are several reasons for being optimistic about the feasibility of a commercial space tourism industry starting this century. The first reason is that *technically* the project lies well within what is possible today. In most respects the technical requirements of both the necessary launch vehicles and the orbital accommodation units lie *within* the limits of technology that either exists or is currently being developed. For instance, accommodation modules required for an orbiting hotel are much less technically demanding than Spacelab modules: There is no requirement for state-of-the-art laboratory hardware, computing equipment or telecommunications facilities. Nor are large amounts of power required; nor are accurately controlled attitude or gravitational fields required in a hotel. Much of the astronomical cost of the planned U.S. space station is to be incurred in developing new technology in all these areas.

Tourism merely requires comfortable accommodations and leisure facilities, which require only standard structural modules with lightweight interior partitioning and suitable furnishings. Environmental control and life support, power, thermal control, attitude control, communications and other systems would need little adaptation from systems that already exist. The only significant new developments are the need for plenty of windows in every module, and semi-

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autonomous environmental control systems with multiple redundancy throughout the facility—and even for these the technologies are already fully developed. The single respect in which space tourism operations would need to be innovative is in achieving standards of safety of both launch vehicles and accommodation facilities similar to civil aviation standards. This is impossible to achieve with current launch vehicles which are expendable or partly expendable, but the use of fully reusable launch vehicles will enable reliability to reach the level of civil airline operations through step by step development.

A second reason for optimism about the prospects for space tourism is the fact that there is enormous scope within the space industry for reducing costs. Space projects today typically involve politically determined developments financed exclusively by governments, followed by production of small numbers of the end product. This is quite unlike normal commercial industries, and among other consequences costs remain extremely high. As an example, while U.S. industry was developing the Space Shuttle during the late 1970s and 1980s, Europe and Japan broadly repeated U.S. work of the 1960s with their development of the HM7 and LE5 cryogenic rocket engines (more or less duplicating the Pratt & Whitney RL10 engine), and they are currently developing the HM60 and LE7 engines (which roughly duplicate Rocketdyne's J2 engine). The resulting low utilization of all these engines ensures that their costs remain extremely high, despite the fact that they are inherently simpler than jet engines.

There have also been some spectacular examples of cost reductions: A company in the U.S. auto industry was recently invited to manufacture some nickel-hydrogen batteries used in NASA satellites. By applying their commercial expertise in cost reduction, they reduced the production cost from $25,000 to less than $1,000, and they expect it to fall eventually below $400! Likewise the cost of food on the Space Shuttle is a fraction of the Apollo astronauts' food bill. Much of it is now bought from supermarkets, instead of being developed from scratch.

In recent years the intensity of competition between manufacturing industries worldwide has rocketed —particularly in the speed of new product and model development, increased product quality and reliability, and speed of reaching mass production. These features have become particular hallmarks of Japanese manufacturing industry, and American and European companies are having to rapidly learn new forms of organization and engineering professionalism in order to catch up. The diffusion of these qualities throughout manufacturing industry is of course exactly what is required to reduce costs in the space industry—in which the Japanese are also making rapid advances.

A third reason for optimism is the very large scale of the potential demand for space tourism services. As already mentioned, opinion polls have found that more than 50% of the population would take a trip into space if given the

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opportunity, but the significance of this figure is greatly increased by the fact that it is based only on curiosity on the part of the public. When better informed about the range of interesting possibilities described above, an even higher proportion of the population would be likely to favor a short "holiday" in space. Perhaps most importantly, however, once space tourism starts, a "word of mouth" effect is likely to accelerate its spread. Hearing how much fun it is from a personal friend who's *been* into orbit will probably be one of the strongest inducements to try it!

Although the high level of spontaneous interest in visiting space is very encouraging, we need to know how many people per year would pay a given price. A "demand curve" is the name of the graph used to illustrate this information (see figure). So for instance, if 10 million people per year were prepared to pay $10,000 for a trip to space, there would be no problem: $100 billion of revenues per year would pay for enormous development expenses. On the other hand, if only 1,000 people per year were prepared to pay $10,000, it would clearly not be feasible: $10 million of annual revenues would be nowhere near enough. So what *do* we know about the demand curve for space tourism?

Market surveys in the U.S.A. suggest that initially a few thousand people per year would be prepared to pay between $50,000 and $100,000 for a short trip into low earth orbit, as proposed by the U.S. travel company Society Expeditions. (Their "Project Space Voyage" comprises a seven day residential stay in a hotel-cum-training-facility on Earth, followed by a twelve hour orbital flight, and is now managed by a separate company, Space Expeditions, also based in Seattle.) Such a level of demand should be enough to justify initial production of the "Phoenix" launch vehicle[1] designed by Pacific American Launch Systems Inc., who have contracted to provide Society Expeditions with the required launch services. Given the likelihood of sales of the "Phoenix" to other customers, some hundreds of millions of dollars of annual tourism revenues should, after deducting operating costs, be able to pay off approximately $1,000 million of initial investment. The project would be a *cinch* if given even a fraction of the billions of dollars of government subsidies provided to the Space Shuttle or Europe's Ariane launcher.

It is not known how many people might pay between $20,000 and $10,000, and obtaining reliable estimates will require well-prepared market research. However, reasonably convincing arguments can be made that as many as one million passengers per year would pay $10,000 for a short stay at an orbital "hotel." This level of traffic (several hundred times current launch rates) would provide major economies of scale: One million passengers, each spending, say, three days at an orbital hotel, would need launch vehicles to transport 20,000 passengers to and from orbit each week, as well as simultaneous accommodation for 10,000 people in orbit, or perhaps 40 hotels for 250 guests each. Such ho-

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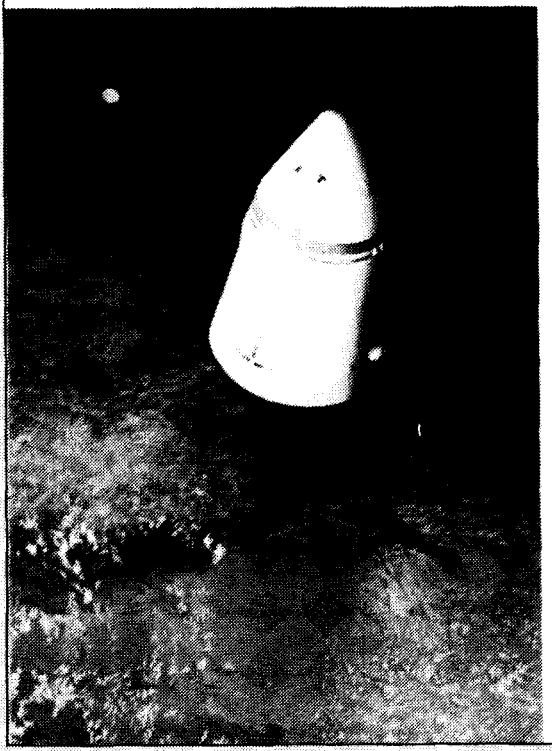

Society Expeditions

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tels might initially comprise some 30 Spacelab-like modules (50′ long by 14′ in diameter), plus perhaps six much larger modules made from converted Space Shuttle external tanks (150′ by 28′ in diameter). The required production runs of 1,200 smaller modules and 240 larger ones, plus perhaps 100 fully reusable launch vehicles, are far larger than have been achieved with space hardware hitherto, and would make a major contribution towards achieving the target of $10,000 per guest[2].

A fourth factor suggesting that commercial space tourism can be expected to develop rapidly (given that these other conditions make it profitable), is the large scale, the rapid growth, and the competitive vigor of the foreign travel industry today. With approximately one million tourists flying abroad *every day*, and a turnover of more than $100,000 million per year, the industry has an annual growth rate of around 5% in real terms (so it will double again by the end of the century). In seeking to generate the large increase in launch traffic that is potentially available from space tourism, intense competitive pressure will be exerted on launch costs, bringing about major cost reductions.

Although the popular image of tourism is of a rather "lightweight" business, comprising mainly simple services such as restaurants and beaches, it has a long track record as a *major* driver of new technological developments— particularly in transportation, telecommunications and computers. The continuing technological improvements in commercial passenger shipping over the past two centuries, and in commercial aviation this century, have been driven primarily by the requirements of the public as customers, while the need for global booking, ticketing and foreign exchange systems required by airlines have put continual pressure on computer and telecommunications systems manufacturers to innovate. Thus it would be no more than a continuation of its past history for tourism to play the leading role in knocking another industry into shape, and bringing the technology of space transportation to commercial maturity.

These facts are very encouraging, and provide good grounds for optimism. The space industry is only just beginning to consider space tourism seriously[1], but all that is needed is a few of the world's *real* entrepreneurs to take an interest—that is, people who can take serious risks with serious amounts of money, in the order of hundreds of millions! If the initial, higher-priced phase begins before the end of the century, with the vigorous growth in demand that could be expected for such a high-profile service, the turnover could reach one million passengers per year within twenty years.

At $10,000 per head, a holiday in space is clearly still not going to be an everyday affair. After all, who has $10,000 to spare? In other words, until the price falls even further to just a few thousand dollars, it will remain a once-in-a-lifetime experience for most people. However, with continuing economic growth, in 20 years' time most middle income earners *will* be able to afford one trip in their lifetime. With

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tax efficient savings plans, if you earned 10% compound interest for 20 years, you would need to put away only $1,500 today, or less than $175 per year. Even at 7% it would be only $250 per year, or $160 per year over 25 years. If a space holiday was *sure* to be available in 20 years' time, many people would be prepared to make this sacrifice, while older people would set up plans on their childrens' and grand-childrens' behalf. Lotteries with tickets as prizes are also likely to become popular, and to be widely used by business as promotional schemes. There are thus many reasons why even a relatively high price (in absolute terms) should not prevent the service reaching a wide public—you and me!

Passenger Launch Vehicles

The costs of all operations in space depend critically on the cost of space transportation, and space tourism is no exception. The design of passenger launch vehicles for low cost, "airline" operations is therefore vital, and work is progressing in two main directions. A major constraint in designing a launch vehicle is the need to carry sufficient propellant. The cost of propellant tanks increase with their surface area, and so, since a sphere has the lowest surface area per unit of volume, a nearly spherical shape is attractive in having the lowest mass for a given quantity of propellant. Using something approaching such a shape, it is possible to design a single-stage-to-orbit vehicle that takes off and lands vertically. Several designs were made of such vehicles in the 1960s[4] and 1970s[5], and more recently by Pacific American Launch Systems[1], all of which are fairly close to spherical, being roughly conical, blunt-nosed, simple cylindrical structures. Society Expeditions' cost target for PacAm's "Phoenix" is $50,000 per passenger, which should be feasible once operations have shaken down, around the end of the century.

The second main route in designing a launch vehicle is to take off horizontally using wings to generate lift in the early stages of the flight. This has the advantage that the initial thrust required is only about 25% of the vehicle mass (instead of about 140% in the case of vertical take-off), but it is possible only for vehicles with a gross lift-off weight of no more than about 500 tons. (The Space Shuttle's weight of around 2,000 tons makes horizontal take-off impossible.) Two-stage winged vehicles, in which only a small upper stage reaches orbit, are much easier to design than single-stage vehicles, and a particularly promising low-cost approach is the "Spacebus" design of David Ashford in the UK[6]. This is somewhat similar to the West German "Sanger" vehicle[3], except that it would be cheaper to develop since it would require less new technology. In such vehicles the propellant cost per passenger will be around $3,000, and the other components of cost will fall progressively as the number of passengers handled grows, given full reusability and long vehicle life.

It therefore seems likely that there will be a choice for space tourists between the more exotic vertical take-off

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vehicles, in which they will experience up to 3 *g* acceleration, and a more conventional airline-like launch in 2-stage winged vehicles. At a later date, when the technology has matured, the development and operation of single-stage winged launch vehicles may be commercially justifiable.

Space Hotels

As mentioned above, the requirements for orbiting hotels could be satisfied easily using equipment developed for the U.S. Space Shuttle and space station. The earliest facilities will comprise simply a few cylindrical Spacelab-type modules, and/or refurbished Space Shuttle external tanks, as proposed for instance by the US External Tanks Corporation[7]. It isn't necessary to be able to predict future developments in detail to foresee that as traffic builds up and prices fall there will be continuing demand for more elaborate facilities. As a result, progressively more advanced hotels will be constructed, starting with larger assemblies of different modules, and later including much larger modules launched in component form and assembled in orbit. Subsequently there will be tethered extensions providing fractional gravity several kilometers above or below the main section. Rotating sections will also be used to provide pseudo-gravity in the style of the classical rotating space stations. Later hotels will also be put in polar orbits, giving wider views of the Earth, as well as scope for interesting transfer trips between facilities. Ultimately orbital hotels will include "buildings" with dimensions in kilometers, which will provide almost limitless scope for novel environments and entertainments.

There is one proviso to all the foregoing—namely that the demand for space holidays will depend critically on their both being, and seeming to be *safe*. This will require assurance on three different matters: First, the vehicles and facilities will have to be mechanically safe, requiring the performance of flight test programs to civil aviation standards, as well as the availability, once in operation, of safety devices and rescue vehicles. Second, health risks must be no greater than for other tourist activities. Short term exposure to zero gravity has been shown to have no damaging effects, but there will be a need for sheltered areas within orbital hotels to provide protection from solar flare particles (for which there are, conveniently, a few minutes' warning). Third, there must be no significant risks from collisions in orbit (primarily with debris). Achieving this will almost certainly require international agreements to reduce debris in orbit, and eventually orbital traffic regulations[8].

Global Implications

If space tourism develops as I suggest, it will have a number of important implications for the rest of the world. First, if one million tourists per year are paying $10,000 for an orbital trip in 20 years time, commercial investment is likely to be rapid, leading to a market of perhaps 20 million passengers per year within a further 20 years. In addition, the reduction in launch costs that

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the growth of space tourism will bring about will make other activities in space commercially viable. For example, the construction of satellite solar power stations (orbiting solar energy collectors with areas of many square kilometers, to be used to transmit gigawatts of electric power to Earth as microwave or laser energy) will be a profitable investment at such launch costs. The demand for energy in the next century from an increasingly industrialized world, given that the use of both nuclear and fossil fuels are likely to face serious constraints, will drive electricity supply industries to exploit such opportunities. This will lead to further progress in space industrialization, including in particular the extraction and processing of metals, ceramics and other materials from the Moon and asteroids.

Second, of the changes taking place in the world, one of the most important for humanity is economic growth in the developing countries, where living standards are generally very low. This requires the continuation of the well-established pattern of global economic development whereby countries industrialize by progressing from simpler manufacturing industries to more complex. This depends in turn on the richer countries continually developing new and more advanced products to balance the developing countries' progressive takeover of more basic industries. Unfortunately, in recent decades there has been insufficient new employment in the richer countries, and growing political pressure to protect their older industries against the more competitive manufactured goods of the developing countries. In this situation, the development of a rapidly growing commercial space industry will create a dynamic new focus for industrial growth and investment in the advanced countries. This will reduce the pressure for protectionism, encourage increased imports from developing countries, and so remove one of the major obstacles to their economic growth.

A further benefit will be to provide commercial demand for many of the most advanced technologies which have been developed primarily for military purposes. By providing an alternative outlet for many of these technological skills, the expansion of a commercial space tourism industry will reduce the need for governments to encourage exports of military equipment which currently aggravate regional conflicts. Thus the development of a proper, commercial, profit-making space industry in the rich countries, initially driven by the currently unsatisfied demand for space tourism, will help to get them off the backs of the developing countries in more ways than one.

A different, but perhaps equally important benefit of the development of space tourism will be to motivate young people to study technical subjects at school, by creating enthusiasm for engineering and science. This was very noticeable in the U.S.A. during the Apollo Program of the 1960s, and is now urgently needed to redress the drift away from sciences seen in the U.S.A. and Western Europe in recent years.

* * *

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Many science fiction stories, such as Poul Anderson's "Tales of the Flying Mountains," are set in a future in which industrial society has spread through the solar system—and this is surely inevitable provided that we do not destroy ourselves or the environment of our planet. However, no stories provide a convincing description of how this is going to come about. The technological potential for the development of a commercial space industry has existed for nearly twenty years—essentially since the maturing of liquid hydrogen rocket technology in the U.S.A. during the 1960s. However, although the industry has seen further technological advances in electronics and materials since then, it has barely advanced *commercially*, and its revenues still come almost exclusively from taxpayers. And since the space industry isn't *profitable* today, it is a burden on the taxpayer, and suffers all the ills of being a political football.

The space establishment is currently proposing to spend some $80,000 million of taxpayers' money to send some scientists back to the moon, and maybe twice this to send a manned vehicle to Mars. This is like a government of the 1920s proposing to spend several times the turnover of the aircraft industry of the day on, say, building a "national aeroplane" to carry 500 people around the world: it would have been an inappropriate project at that stage of the industry's development, and would have diverted resources away from commercial purposes. What *actually* happened was *much more valuable*: the government subsidized the establishment of a competitive commercial aviation industry (both manufacturers and airlines) by offering guaranteed mail contracts. The objective of flying round the world was of course achieved spontaneously in due course, without further taxpayers' funds.

A similar step today, subsidizing the development of true passenger launch vehicles, would cost only a *small fraction* of $80,000 million; would be *much* more popular with the public; and would be *far* more economically beneficial, not least by establishing a commercially self-sustaining space industry. And once the space industry is independently profitable, its destiny will be in its own hands, with no foreseeable limits to growth. As taxpayers *we* pay for government funded space programs. It is therefore up to *us* to tell politicians how to spend these funds. If we want space tourism (which appears to be the case), we have only to start pressing for it. Governments could do a lot worse than take a page out of the history books, and guarantee to purchase a minimum number of passenger seats into orbit each year. The idea that the door into the Space Age will be opened by the "human" route of popular curiosity —people taking holidays in space to see what it's like, rather than elitist activities of central government—is an attractive one. ■

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About the Author

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MANAGEMENT
is the task of those interposed between the
leaders
and the
doers
of an enterprise.

Gifford Pinchot, III
Intrapreneuring

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THINGUMMY HALL

Pauline Ashwell

Think about this the next time you go to a convention . . .

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I became a Desperate Woman on Monday morning, seven minutes after getting to the office. Two minutes to check the Ansafone, four to get in touch with the manager, one to learn that his reason for calling was to cancel our booking on the grounds that the hotel was about to fall down.

The district science fiction convention was held every three years, always at the hotel; it was the only place within twenty miles' radius where the public rooms were big enough.

I once spent six months in the Licensing Department, in the section which deals with buildings and their uses, and I knew every place in the county that had ever been hired for a public occasion. Apart from the hotel there were exactly five institutions within practicable distance having facilities that would do at a pinch. I called them one after another and was told politely that they had been booked solid a couple of years in advance but, yes, if by any chance they had a cancellation they would call me first thing.

I called the printers and told them to hold everything till further notice. Then, although it was a slack period in my department, I put in about ten minutes on the work I was supposedly getting paid for, rerouting a number of not-so-urgent files, sooner than start on the next phase.

But, obviously, the rest of the convention committee had to be told.

I started with Fred, because he is a man of few words—though he does space them out a bit. He wouldn't suggest we try to borrow a Stately Home during the tourist season, or ask a farmer to lend us his barns in the middle of the harvest. I told him the ghastly facts.

After thirty seconds he said "That's a pity."

As a matter of form, I asked if he could think of any other place for me to try.

He said, "Umm. Well. Er . . . Well. Er . . . Oh." Twenty seconds of silence. "Just give me ten minutes, eh?" and he rang off.

I did not for a moment believe Fred would come up with anything, but it was an excuse to put off calling the next Committee member on the list. I ticked off my initials on the covers of a couple of files, and filled in a form or two.

In precisely ten minutes Fred phoned again.

"Oh . . . Maggie," he said. "Er. . . . About halls. I . . . umm . . . I had an idea, Ted Head said something, so I called him. And . . . er . . . well, he did. Disused cinema, in West Street."

My heart, which had crept up level with my knees, dived back to my boots.

"Not the old Plaza!" I said. "It's been derelict for twenty years."

"Er, well . . . not quite," said Fred. "Used as a warehouse. Kept it watertight . . . Been done up, now, seemingly."

"Has your friend Ted actually used it?" I asked suspiciously.

"Actually, no. Rotary Sec, got offered it for Ladies' Night, but they always use the Assembly Rooms. But . . . er . . . any port in a storm."

That, of course, was all too true.

"All right," I said. "I'll look into it. What's it called nowadays?"

"Yes, well. . . . Ted couldn't remember the name. Something Hall.

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Thingummy Hall—he had the number, though."

I took it down, thanked him, stuck the files in the OUT tray and called the number.

It rang four times and then there was the little click, followed by an echoing silence, that means an Ansafone at the other end. Finally a male voice that had studied elocution said "This is a recorded message. Please state your name, address and telephone number and the nature of your requirements. We will get back to you as soon as possible."

I stated my name, address, and telephone number and the nature of my requirements—roughly, a miracle—and picked up another file.

Five minutes later my immediate superior called me in to deal with a department emergency. I got away about twelve, with an appointment to see the Councillor involved at 1:45. Just as I got back to my office, the phone rang.

"Maggie Marsh?" said the well-trained voice.

I admitted it.

The voice recited my statement of requirements, without admitting or implying that they were impossible, outrageous, or even out of the way. I began to feel breathless.

I said, "Yes. That's what I need."

"We have accomodation at Number 57 dash 65 Back Street," said the voice. "When would you like to view?"

"I could come at 12:30," I said.

"We will expect you," said the voice, and rang off.

I was lucky with buses and got there fifteen minutes early. The place was exactly as I remembered it. The paintwork was still peeling in the same places. The glass panel in the lower left-hand door still had the crack I had noticed when I was taken to see *Invasion of The Body Snatchers* at the age of seven, and the step on which I had stumbled when we came out into daylight still had the chip on which my foot had slipped. Even the three PepsiCola cans arranged on the top step had a familiar look.

Abandoning hope, I went up the steps.

As I approached, the doors slid out sideways. That definitely was *not* according to my memories. They had opened inwards, and you had to push.

My heartbeat started to accelerate. I went through and found a barrier a few feet inside. It was a simple unbroken sheet of wood or steel or plastic blocking all the space between the ceiling and the floor. In the centre was a bell-push, with the words "please press" in a semi-circle below it. Inverted commas and all.

I pressed.

Immediately a gap opened in the apparently seamless wall and a man came through.

I had two thoughts about him, simultaneously. One was that he must be the handsomest man I had ever seen, on or off any size of screen. The other was that he was suffering from a hangover—not the first stage, where your head hurts all the time, but the second, where you're afraid that whatever you do will make it start hurting again.

(Information and observation, not personal experience.)

He said "Maggie Marsh? Please come in."

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Then he took hold of my hand and gave me an electric shock. Not as bad as one of those electrified finger-rings worn by a few idiots at early conventions, but stronger than I ever got off a rug.

His own hand jerked slightly, but he didn't let go. He led—pulled—me towards the barrier, and I realized suddenly that the gap he had come through was closed again, with no visible line or seam to show where it had been. I hung back slightly, I suppose. Anyway, he got there first, and went straight on through. It parted presumably—I didn't have time to see, because the pull strengthened and in a moment I was going through it myself. No sense of contact. Just a hint of resistance, like brushing through a cobweb, and I was on the other side.

This bore no relation at all to the old cinema. Nor was it in the least like any estate agent's office I had ever been in. It looked more like the computer section at a Convention. There were several desktop jobs around, and the cabinet just beside the section of wall we'd come through looked like a main-frame type. (The wall, on the other hand, looked like a wall; no door-frame, no sign of where we had come through). There were also what looked like the monitors of a closed-circuit surveillance system except that they usually don't waste money on colored screens. In addition there were easy chairs of a pattern I didn't recognize, several square meters of desk with an expensively mat surface, and a big bookcase with a lot of battered old bindings in transparent cases individually tailored to fit.

The man, my guide? captor? estate agent? led me to a chair, still holding my hand. I looked down at it. He suddenly dropped it as though it had stung him, and the hungover look intensified till I wondered whether to offer him an aspirin.

There was a lot about the situation that I didn't understand; correction—there was hardly anything I *did* understand. I could feel a prickling at the back of my neck, and some under-part of my mind was exploding into Gosh! Wow! Gee-whizz! complete with exclamation marks like a comic strip, but I was too busy taking things in to throw a fit. I sat down, crossed my ankles, and waited to see what would happen next.

The man sat down too and gazed at me blankly. You just might account for his behavior by supposing he was a new and nervous trainee whose boss was out to lunch (though that wouldn't explain the rest of it). I said sternly, "May I have your name, please?"

He jerked into action, looked all over the desk, then opened a drawer and produced one of those triangular wooden prisms. CARL SCHOCKER, it said.

"Well, Mr. Schocker," I began.

"Carl Schocker," he interrupted. He sounded faintly puzzled.

"Carl Schocker," I agreed. "I'm giving up my lunch hour to inspect your accomodation, so may we get on and see it, please?"

For a couple of seconds you might have thought I'd spoken in Sanskrit. After that it was more as though I'd told him he was the father of my unborn child. I think his hair stood on end. He gazed all round the surface of the desk as though looking for a way out, then

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suddenly got to work on a keyboard—presumably belonging to a computer, though his finger-action reminded me of a jazz-player rather than a hacker. After a few seconds, however, he broke off and pressed something on the edge of the desk. A slot in the top suddenly fed me a long buff colored form.

There was so little that was recognizable about the occasion that the introduction of a standard ploy—when in doubt, hand out a form—was rather reassuring, until I looked at the thing.

It started out reasonably enough; home address and telephone number, occupational address and number, organization for which booking is made, dates booked. Then it went off into a mixture of jargon and boxes.

INCOLLECTUAL INDEX	Inf [27] Inst [22] Obs [ ]	
CHARISUS INDEX	Inf [19]	Circ ....
	Obs [ ]	Circ ....
SYMP	Obj. [ ]	Circ ....
	Pers [ ]	

The thing I liked least about it was that several of the boxes were already filled in. Since my name had been filled in too, that seemed to mean that somebody had been analyzing and classifying me secretly.

I said "What the hell is an Incollectual Index?"

He gave a gasp and his eyebrows shot up nearly to his hairline. He snatched the form, crumpled it, and hurled it away; then started performing another fantasia on the keyboard. Then he slapped the edge of the desk, and another form slithered out and landed in front of me.

It started out like the other one, then went off into a mass of details about Space And Facilities Required.

I stood up.

"Look, M—Carl Schocker," I said, "I know roughly the size of this building. If we decide to hold the convention here, we'll need all the space you've got. So all these measurements you're asking for aren't really relevant. Now can we go and look at the facilities, please?"

I didn't wait for an answer. There was a door—a quite normal one, from the look of it—in the opposite wall. I swept across, opened it, and went through.

The floor was not there.

Actually my left foot only dropped about nine inches, no worse than when you miss the bottom stair. But the floor was tilted, not just away from me but also from left to right; my right foot dropped about fifteen inches and then slid from under me, and I ended flat on my face.

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I rolled over in a hurry and saw Carl Schocker standing in the doorway looking distracted. He made to step down, half extending his hand; then he turned and ran back into the office.

I sat up; whereupon the floor started to shift. It rose and it tilted, quite rapidly, until in about a half a minute it was level with the sill, and perfectly flat.

Carl Schocker shot back into view and started hauling me to my feet. I shook him off and got up in my own time, breathing hard. Then I turned, carefully, and looked around.

I was on the edge of an enormous empty volume, many times bigger than the old Cinema. The ceiling was a long way up—I couldn't even guess how far. Sideways and lengthways it seemed to go on until the lines converged at infinity. Well, maybe not quite; I thought I might be able to make out the far boundaries, but they were misty and indistinct.

Otherwise there was nothing to see; no partitions, no doorways, no furniture. Not even a bit of rubbish in a corner. Everything was a very pale grey and so far as my vision extended it was spotlessly, clinically, sterilely clean.

I sniffed. The air was clean, too—no must, no dust. Not too dry, not too damp. Air-conditioning, I supposed; though I couldn't hear it.

Carl Schocker said accusingly, "You come in too soon. How I put walls without dimensions? Not filling the form."

I turned and walked back into the office. After what I'd just seen it looked quite ordinary. I went back to my chair and said "If I fill in the form, you will put the walls in to make rooms of the right size, is that it?"

He thought that over for a moment.

"Also ceilings," he said.

"How about furniture? —Chairs and tables?" I added, as he looked blank.

"Also chairs and tables. Also toilets, wash-basins, wastebaskets. I am instructed. I instruct the machine."

I swallowed rather hard. I could just about imagine computer-directed robots setting out partition walls, tables, chairs—at least my imagination didn't actually refuse to have anything to do with the idea. It did boggle the idea of plumbing being installed at the touch of a button. Or *was* that what he was implying—?

"Show me," I said.

By way of answer he shoved the form at me again.

I filled it in from a memory of the accomodation we had used at the hotel, amended according to a rough estimate of the size of the old Cinema, and shoved it back. He set to on the keyboard, giving a really virtuoso performance. After about ninety seconds he sat back and looked at me for applause.

I said "How long does it take?"

"Now!" He got up and opened the door.

This time I walked through into a large but not enormous hall, with a stage at one end and a slight rake to the floor. It had rows of padded chairs arranged in accordance with County Fire Regulations (but no fire extinguishers: I made a mental note about that). On the far side were two doors with the usual markings; I went through the LADIES one and found a handsome array of plumbing, complete with soap dispensers and drying machines. I went into

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one of the stalls and pulled the handle. It worked.

No toilet rolls, though.

I was making a mental note about that when the sheer preposterousness of the whole thing struck me like a juggernaut.

Nobody can do this sort of thing. Or if they can, if I'm just out of date on technology, they wouldn't use it to do *this* . . . but anyway they can't do it. That huge great place I saw, many times the size of the old Cinema building—and the old building was still there outside, I walked half way round it getting here—that just was not possible. Not in my time, and planet, and Universe. . . .

There was a chair in the corner. I sat down on it and thought for several minutes. Then I walked back into the hall.

It would be a perfect place for the Convention; at any rate if he'd put the extra rooms I'd asked for, upstairs. I was tempted to go and see . . . but Carl Schocker was standing in the office door, looking anxious.

Granted somebody could do all this, why the *hell* would they want to waste it on a small science fiction convention? Not even a WorldCon; just a district thing? A moderately run-down sort of district, at that? Carl Schocker wasn't just willing to let us use it, he *wanted* us to.

Why?

"Is right?" he asked eagerly as I approached.

"Is fine," I said. That sort of thing is catching. "How much do you charge for a three-day let?"

Without blinking, he named a sum roughly three-quarters of what we would have paid for the hotel.

"One thing I have to know," I said. "Where is the hall? I know it isn't here."

He knew what I meant all right. He sat down behind his desk and looked at the nearest computer for a moment, then he raised his eyes to my face.

"The hall is here," he said slowly, "but here is not the place you expect."

Sorting that out could take a long time, and I was beginning to think I ought to get back to the office. . . . I fished in my bag and got out a note pad and ballpoint. When I'd finished writing I tore off the sheet and handed it across. *Name:* CARL SCHOCKER.

1. Do you come from
   a) Another Time? [ ]
   b) Another Planet? [ ]
   c) Another Universe? [ ]
   d) An Alien Race? [ ]

Tick where appropriate.

2. What is your purpose in coming here? .....
.....

He looked at it absolutely dead-pan for about five seconds; then he picked up my ball-point and made a tick. He wrote something briefly and handed the paper back.

The tick was in the box beside "Another Universe."

His purpose in coming was given as "Rehabilitation."

I said "*Rehabilitation?*"

Carl Schocker gave me a look of what seemed to be despair; then he got up and walked straight into the wall. Not the bit we had originally come through, but one next to the filing cabinet behind his desk.

The back of his jacket was still disappearing when he reentered, this time

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from beside the book case. He had combed his hair and put on a different jacket, and he looked rested and happier than before.

He was carrying a small box in one hand. He put it down on the desk. "They say it is all right to explain," he said.

Naturally, I said, "Who do?"

"The—" he had to think about that one—"the Administration. They say if you talk, nobody believes. If they come to look, nothing to see. We shut up shop and try another location."

"Location for what?" I said.

He gave me a look—he seemed to have picked up some self-confidence in the minute or so since I saw him last—and pressed the top of his box.

"Explanation," said the box in his voice.

"My people are from Earth, but in another Universe. Is not what you call parallel. It was push out from this Universe, like a little sprout, in the year you call three thousand, three hundred, one.

"In that time was a man who did not like the way of living. He was a very great genius and he made push out this little sprout from the Universe and then separate, so it is a new Universe with time and space of its own.

"He has made it to take air and all for living, like a space-ship. He fetch some people who also do not like the way of living on Earth. He can make connection with this Earth at any time and place, to take new air and water and food and more people, who also wish to escape. They live there and also they go to places on Earth, some in the past before Man to mine for things they need, also farming, hunting, you see? Some to times after Man, to do shopping?"

I said, involuntarily "Shopping?"

He touched the box and the voice stopped.

"Is the word wrong? To *buy* things with *money*."

"That's right," I said weakly. I suppose that even with a Universe at your disposal self-sufficiency might be more trouble than it's worth.

"For shopping, they need ways to get money. Also places to put—to put things they buy."

"Warehouses," I said. My mind made a jump. "Is that what they use this place for?"

"Did," he said. "No more. Was sufficient stock from this place-time already."

As I didn't say any more, he tapped the box and it began to talk again.

"But our Universe is not made forever, only one thousand years. People use it to find planets of other stars. Then they can make the worlds grow like Earth. Air, trees, grass, animals. They have all of Time to use; put seeds, go back after one million years and put animals also. Then when worlds are ready, the people move in.

"Only some people, they do not wish to go. They like the little Universe, they feel safe, they can make it how they wish. So they take one part and close it away. They stay there and have their children. The children do not know any other place. They have children also. The other people of that Universe do not know.

"Then comes the time when all the other people are going. Few stay behind a little, to look round and check no one

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is lost anywhere. They find where my people are hidden. It is the first time we ever saw any other people than the ones we know."

I looked at Carl Schocker. He was listening to himself calmly enough. For a moment I tried to imagine what it would be like, to have grown up in one place, perhaps never hearing that other places existed, and then to have strangers crashing in. . . .

"They tell us in not very long our Universe will start to break up and we will die. So we must come out and learn to live in another place first, where we learn to see strangers and not be afraid. They call to other people, who know much about this world and different times. One of them knows this place."

"For God's sake!" I said. "Why pick a place like this? What are you supposed to be doing here?"

"We will learn," said Carl Schocker simply. "The people who know this place-time will stay with us at first, to teach. Already I have learned much."

I threw my hands up. The gesture brought my wrist-watch in line with my eye.

"Hell!" I said. "I ought to be back at work!"

"You need more time?" he enquired.

"I haven't got any more time," I said.

He started tapping at his keyboard again.

"I make it outside the time that you came in," he said proudly.

At the time, I didn't get it. I was thinking that if I didn't keep my appointment on time there would be hell to pay. Also, I needed to get away to my normal, bustling, workday environment and find out whether I believed any part of this weird experience. . . . I turned automatically to the place where I had come in and discovered that there was a door there now.

Carl Schocker said anxiously, "Will you hire the hall?"

"I'll have to discuss it with my committee," I said. "I'll let you know."

Outside I took a deep breath of dusty, petrol-smelling air and tried to decide whether I had been dreaming, hallucinating or simply going off my head. Then I saw a bus standing at the stop. I ran, and arrived just too late.

Another woman arrived at the same moment.

"Be another at half past," she said philosophically.

My watch showed 1:37.

"Half past what?" I said frantically.

"Half past twelve. You all right, dear?"

"Yes," I said. "Yes, I'm all right. What do you make the time?"

"Dunno exactly, but the clock said just after the quarter when I came out and it takes five minutes to get to this stop."

So it was twelve twenty; a minute or two after I got here. If I looked back I might even see myself standing on the Cinema steps. More probably I'd just gone inside, but anyway I preferred not to look. . . .

No, that was rubbish. That had to be rubbish. The whole thing had to be . . . what? A hallucination? Insanity? . . . Hypnotism? We'd had a hypnotist at the last convention, three years ago. So far as I could remember I had not been one of those who went on stage

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to play victim, but he could have told me to forget. . . .

I might have forgotten. My friends wouldn't. Maggie Marsh submitting to Mesmer Junior? I'd never have heard the last of it.

Among the people who frequent science fiction conventions you get some ferocious practical jokers. Fred, however, is not among them. And anyway, this episode was far beyond the state of the art; far, far beyond.

No, it had to be insanity. At the moment I found that less disturbing than the alternative—

The bus arrived. I climbed on and felt in my handbag for my purse. Along with it I got hold of a bit of paper and my hand came out with both of them. I paid, and looked at the sheet.

It was the form Schocker had given me, headed *Space and Facilities Required*.

The helpful lady from the bus-stop was quite worried about me. Fortunately nearly all the seats were taken and she couldn't sit next to me. She got off, patting my shoulder on the way out, two stops before mine.

I was busy trying to face something. A responsibility, perhaps. Knowledge, anyway.

There were Aliens Among Us with Strange Powers and I was probably the only person who knew.

The books are not encouraging about people in this situation. The movies are less so. (*The Invasion of the Body Snatchers* was the first science fiction movie I ever saw.)

But he looked and seemed so *harmless*, damn it. And astonishingly naive—as he would have been, of course, if that incredible story had been true.

Was it even incredible, given all the other circumstances?

Well, if you had to rehabilitate people for the reasons described, would *you* set about it by sending them to run a public hall for science fiction conventions? Or even a Rotary Ladies' Night?

Answer; I don't know *how* I'd set about it. If the problem is to get them used to meeting people, observing strange life-styles, and that sort of thing, I suppose that might not be the worst possible way.

Second Answer; I wouldn't set about doing *anything* that way. As a method of running the Invasion of Earth, for instance, it strikes me as plain ridiculous.

Next Question: what am I going to *do?*

Tell somebody? Schocker's Instructor or Therapist or Ringleader or what have you was right about that. I didn't see how it could accomplish anything at all. Except, perhaps, to upset Schocker's rehabilitation. Nice, if the first person he met back on old Mother Earth betrayed him and called him a liar. . . .

Did I believe him, then?

I suddenly realized I'd overshot my stop. I got off and started walking back.

Good thing Schocker had set the time back for me or the Councillor would be wanting my blood.

If people had that sort of power over Time and Space, and were planning anything to the detriment of Earth and its people, would they set about it like that? By trying to let off a disused Cinema as a public hall, for God's sake? How do I know *what* they might do? By common sense, that's how. Or

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look at it this way; if you try to interest the Police, the Secret Service, even the County Council with a story like that, the main result will be to land you in the loony-bin—no, I forgot, nowadays it's "Community Care." Oh, they'll probably have a sniff round Thingummy Hall—and Schocker's advisor will pull him out and abandon the place and we *still* won't have anywhere to run the convention.

If aliens from Another Universe are plotting something against us in the old Plaza building, making them pull out will not frustrate their knavish tricks; they'll just go somewhere else. Whereas 600 conventioners let loose in the place are as likely as any group I know to uncover anything sinister that might be going on.

Suppose they did uncover something, and got hurt because of it?

In that case we're all going to get hurt, most probably, and the sooner we find out the better. But I don't believe that what's going on is really sinister. It doesn't *feel* as though it is.

You're taking a hell of a responsibility.

I'm doing that either way. I just have to choose; Action or Inertia. I choose Action. Why not? Am I a man, or a mouse?

Certainly not.

I was back in front of County Hall. I glanced at my watch. I just had time to call Schocker and confirm the booking before my appointment.

I'd have to wait till afterwards to call the committee and tell them we were moving the convention to Thingummy Hall. ■

IN TIMES TO COME

●July's cover, by Janet Aulisio, introduces Pauline Ashwell's new novella, "Fatal Statistics." Lizzie Lee, the decidedly individual heroine of several previous ASF stories, returns on what was *supposed* to be a field trip as part of her education in cultural engineering. A funny thing happened on her way to the planet she was supposed to study: its civilization collapsed and most of the population was evacuated. This didn't leave many people to study, but some of them had a most peculiar set of problems. And those turned out to be a good practical exercise in cultural engineering after all . . .

John Gribbin has the fact article, "Seeking the Missing Mass." We've had articles before about the fact that the universe seems to contain far more mass than we can see, but Gribbin's article describes a rather new approach to trying to locate it—a British experiment that promises to be a real bargain for these days, delivering information of fundamental cosmological importance at far less than the usual cost of such things.

We'll also have stories by Michael F. Flynn, Joseph H. Delaney, Dr. Robert L. Forward, and the irrepressibly irreverent Rowland Shew.

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THE COMRADE

Poul Anderson

Most people tend to be happiest
among their own kind.
But if that kind is very rare . . .

Todd Hamilton

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A ship was loading at the Claudian dock. She was big for an ocean-goer, two-masted, her round black belly taking perhaps a thousand tons. The gilt sternpost, curved high over the steering oar fixtures in the form of a swan's neck and head, also bespoke wealth. Lugo went over to inquire about her. Bound more or less this way, he had turned aside with the idea of seeing what went on at the waterfront. He made it his business to keep fully aware of the world around him.

The stevedores were slaves. Though the morning was cool, their bodies gleamed and reeked with sweat as they carried amphoras across the dock and up the gangplank, two men to each great jug. A breeze off the river mingled whiffs of fresh pitch from the ship with their odors. The foreman stood by, and him Lugo could approach.

"The *Nereid*," he replied, "with wine, glassware, silks, and I don't know what else, for Britannia. Her skipper wants to catch tomorrow's early tide. Hoy, you!" His whip flicked across a bare back. It was single-stranded and unloaded, but left a mark between shoulder blade and loincloth. "Move along, there!" The slave gave him a hopeless glower and trudged a little faster to his next burden at the warehouse. "Got to freshen 'em pretty often," the foreman explained. "They get out of shape and lazy, sitting around idle. Not enough to do anymore." He sighed. "Free men, you could lay off in these wretched times, and call back when you needed them. But if everybody's in his station for life—"

"It's a wonder this vessel is going," Lugo said. "Won't she draw pirates like flies to a carcass? I hear the Saxons and Scoti are turning the shores of Armorica into a blackened desert."

"The House of the Caelii always was venturesome, and I guess there's a big profit to be made when so few dare sail," the foreman answered.

Lugo nodded, stroked his chin, and murmured, "M-m, sea rovers usually do seek their plunder on land. No doubt *Nereid* will carry guards as well as her crew being armed. If several barbarian craft came in sight, Scoti probably couldn't climb that tall freeboard out of their currachs, and given any kind of wind, she can show her heels to Saxon galleys."

"You talk like a mariner yourself. But you don't look like one." The foreman's glance sharpened. Suspicion was the order of the day. He saw a medium-sized, wiry man of youthful appearance; face narrow and high in the cheekbones, curved nose, slightly oblique brown eyes; black hair and a neatly trimmed beard such as was coming into fashion; clean white tunic, blue cloak with a cowl shoved back; stout sandals; staff in hand, though he walked lithely.

Lugo shrugged. "I've been around. And I enjoy talking to people. You, for instance." He smiled. "Thanks for satisfying my curiosity, and a good day to you."

"Go with God," said the foreman, disarmed, and turned his attention back to the longshoremen.

Lugo sauntered on. When he came opposite the next gate, he stopped to admire the view eastward. His lashes snared sunlight and made bits of rainbow.

Before him flowed the Garumna, on

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its way to its confluence with the Duranius, their shared estuary, and the sea. Some two thousand sheening feet across, the water bore several rowboats, a fishing smack bound upstream on oars with its catch, a gaudy spritsail above a slim yacht. Land on the far side reached low, intensely green; he saw the tawny walls and rosy tiles of two manor houses amidst their vineyards, while smoke blew in tatters from humbler roofs of thatch. Birds winged everywhere, robin, sparrow, crane, duck, a hawk on high, the startling blue of a kingfisher. He heard their calls as an overtone that skipped through the lapping and rustling of the river. It was hard to imagine that heathen Germani raged at the gates of Lugdunum, that the chief city of central Gallia might even now have fallen to them, less than three hundred miles from here.

Or else it was all too easy to imagine. Lugo's mouth tightened. Come along, he told himself. He was more prone to reverie than other men, with less excuse nowadays. This vicinity had been spared so far, but the handwriting on the wall grew plainer for him to read every year, as certain Jews he had known would have phrased it. He turned and reentered the city.

The gate was minor, a sally port in the bulwarks whose towers and battlements stood foursquare around Burdigala. Beside his spear, a sentry leaned half asleep against the sun-warmed stones. He was an auxiliary, a German himself. The legions were in Italy or out toward the frontiers, and mere skeletons of what they had once been. Meanwhile barbarians like this wrung leave from the Emperors to settle in Roman lands. In return, they were supposed to obey the laws and furnish troops; but in Lugdunensis, for example, they had revolted. . . .

Lugo passed through, across the open pomoerium, into a street that he recognized as Vindomarian Way. It twisted among buildings whose flat sides crowded out all but a strip of sky, the lumpiness of its cobblestones slickened by stinking offal, an obscure lane quite likely going back to ages when only the Bituriges squatted here. However, Lugo had in the course of time taken care to learn the entire city, old as well as new quarters.

Not many people jostled him, and they for the most part were shabbily clad. Housewives chattered together while they carried laundry to the river, pails of water from the nearest aqueduct outlet, baskets of vegetables gotten at a local marketplace. A porter came by under a load well-nigh as heavy as what was in the donkey cart he met; he and the driver cursed, trying to get past each other. An apprentice fetching wool for his master had stopped to jape with a girl. Two countrymen in ancient-style coats and breeches, probably cattle drovers, made remarks so accented and full of Gallic words that Lugo could hardly understand what he overheard. A drunken man—a laborer to judge by his hands, out of work to judge by his condition—lurched along in search of a frolic or a fight; unemployment had become rife as the upheavals of the past decade cowed an already decaying commerce. A meretrix in pathetic, bedraggled finery, seeking customers even this early, brushed against Lugo. Except for laying a hand over the purse at his waist

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he ignored her. A hunchbacked beggar whined for alms in the name of Christ and then, when likewise ignored, tried Jupiter, Mithras, Isis, the Great Mother, and Celtic Epona; finally he screamed maledictions at Lugo's back. Shock-headed children in grimy smocks ran their little errands or played their little games. For them he felt a tug of compassion.

His Levantine features marked him out among them all. Burdigala was cosmopolitan: Italy, Greece, Africa, Asia had poured blood into it. Yet most dwellers remained what their forebears must always have been, strongly built, roundheaded, dark of hair but fair of skin. They spoke Latin with a nasal intonation he had never quite mastered.

A potter's shop, its front open on the wares and whir of the wheel, showed him where he must turn onto broader Teutatis Street—which, lately, the bishop was trying to make its residents call after St. Johannes. It was his quickest route through this maze toward Mother Thornbesom's Lane, where lived the one he sought. Rufus might not be at home, but was certainly not at work. The shipyard had had no orders for well over a year, and its men were now dependent on the state for their bread; circuses amounted to an occasional bear-baiting or the like. If Rufus was out, Lugo was prepared to stroll around inconspicuously till he came back. Lugo had learned patience.

He had gone a hundred yards farther when the new noise reached him. Others heard it too, halted, stiffened, listened with heads cocked and eyes slitted. The majority began retreating. Shopkeepers and apprentices made ready to close doors and shutters. A few men licked their chops and drifted in the direction of the sound. Turmoil called their kind to itself. The racket loudened, muffled by houses and contorted alleys but unmistakable. Lugo knew it of old, the deep, racking growl, the yelps and hoots. A crowd was hounding somebody.

He realized with a chill who the quarry must be. For a moment he paused. Was it worth the risk? Cordelia, the children, he and his family might have thirty or forty years ahead of them.

Resolution came. He should at least go see whether the situation was hopeless or not. He pulled the hood of his cloak over his head. Sewn to the edge was a veil, which he drew down. He saw reasonably well through the gauze, but it hid his face. Lugo had learned preparedness.

A military patrol might wonder at the sight and stop him for questioning. However, were a patrol in the neighborhood, that pack would not be after Rufus. Instead—Lugo's mouth twisted briefly upward—Rufus might well be under arrest.

Lugo moved to intercept the oncoming tumult, as closely as he could judge. He went a trifle more quickly than the trouble seekers, not quickly enough to draw any special heed. The hood overshadowed the veil and blinkered sight of it; perhaps nobody noticed. Within himself he spoke ancient incantations against danger. Give fear no hold upon you, keep sinews loose and senses open, ready at every instant to flow with the rush of action. Calm, alert, supple; calm, alert, supple—

He came out on Hercules Place just

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as the hunted man did. A corroded bronze statue of the hero gave the small square its name. Several streets radiated thence. He who burst forth was stocky, his coarse features freckled, his thin hair and unkempt beard an unusual orange-red. The tunic that flapped around stout limbs was drenched and a-reek with sweat. Indeed this must be Rufus, Lugo saw, and "Rufus" must be a nickname.

The fugitive was built for strength, not speed. His pursuers swarmed close behind. They numbered about fifty, proletarians like him in drab, oft-mended garments. Quite a few were women, locks gone Medusa wild around maenad faces. Most bore what weapons they could snatch, knife, hammer, stick, loose cobblestone.Through their baying tore words: "Sorcerer! . . . Heathen! . . . Satan —kill—" A flung rock struck Rufus between the shoulders. He staggered and pounded on. His mouth stretched wide, his chest heaved, his eyes stared as if blinded.

Lugo's gaze flickered. Sometimes he could not wait and see how things went, he must make an instant decision. He gauged the layout, distances, speeds, nature of the throng. Terror thrilled through the hatred they howled. The chance of rescue looked worth taking. If he failed, he might escape with injuries less than fatal; and those would soon heal.

"To me, Rufus!" he shouted. To the pack: "Halt! Hold off, you lawless dogs!"

The man in the lead snarled at him. Lugo brought hands near the middle of his staff. It was oak. He had drilled holes in the ends and filled them with lead. It whirred and smacked. The man screamed. He reeled aside. A broken rib, likely. Lugo's weapon punched the next under the breastbone. Air whoofed from lungs. Lugo caught a third man across a kneecap. He shrieked his pain and flailed against two at his back. A woman swung a mop. Lugo fended it off and rapped her knuckles. Maybe he cracked a bone or two.

The crowd recoiled on itself, milled, moaned, gibbered. From behind his whirling, half invisible staff, Lugo grinned at them and at the rowdies who had appeared. "Go home," he called. "Dare you take the Caesar's law in your own hands? Be off!"

Somebody threw a stone. It missed. Lugo laid a blow on the nearest scalp. He controlled its force. Matters were amply bad without producing corpses; those would provoke immediate official action. Nevertheless the wound bled spectacularly, sudden red brilliance over skin and pavement, a shock to behold.

Rufus's gasps rattled. "Come along," Lugo muttered. "Slow and steady. If we run, they'll be after us again." He backed off, still twirling the staff, still grinning his most wolfish. At the corner of vision, he saw Rufus sidle on his right. Good. The fellow had kept that much wit.

The hunters mumbled and gaped. The hurt among them ululated. Lugo entered the narrow street he had chosen. It bent around a tenement, and he had no more sight of Hercules. "Now we move," he clipped, and turned around. "No, you fool." He caught Rufus's sleeve. "Don't run. Walk."

Such people as were present looked warily at them but didn't interfere. Lugo ducked into the first alley he knew con-

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nected with a different street. When they were alone at the noisome middle of it, he said, "Stop." He put his staff beneath an arm and reached for the fibula that held his cloak. "We'll drape this over you." He tucked the veil back inside the cowl before he covered his companion's distinctive hair. "Very well. We are two peaceful men going about our business. Can you remember that?"

The artisan blinked from the hood. Sweat glistened in what light there was. "Who, who be you?" His voice quavered deep. "What you want?"

"I would like to save your life," Lugo said coldly, "but I don't propose to risk mine any further. Do as I say and we may yet make it to shelter." When the other began in a dazed fashion to seem doubtful, Lugo added, "Go to the authorities if you wish. Go at once, before your dear neighbors pluck up courage and come in search. Tell the prefect you're accused of sorcery. He'll find out anyway. While you're being interrogated under torture, you might think how you can prove your innocence. Sorcery is a capital offense, you know."

"But you—"

"I am no more guilty of it than you are. I have a notion we can help each other. If you disagree, farewell. If not, come with me, and keep your mouth shut."

Breath shuddered into the burly frame. Rufus drew the cloak close about him and shambled along.

His gait grew easier as they proceeded, for nothing untoward happened. They simply mingled with traffic. "You may think the world is ending," Lugo remarked low, "but it was a purely local fuss. Nobody elsewhere has heard of it, or if anyone has, he doesn't care. I've seen people go on with their everyday lives while the enemy was breaking down the gates."

Rufus glanced at him, gulped, but preserved silence.

Lugo's home was in the northwest quadrant, on the Street of the Sandalmakers, a quiet area. The house was unostentatious, rather old, stucco peeling off the concrete here and there. Lugo knocked. His majordomo opened the door; he kept only a few slaves, carefully chosen and winnowed over the years. "This man and I have confidential matters to discuss, Perseus," he said. "He may be staying with us a while. I do not wish him disturbed in any way."

The Cretan nodded and smiled his bland smile. "Understood, master," he replied. "I will inform the rest."

"We can trust them," Lugo said aside to Rufus. "They know they have soft berths." To Perseus: "As you can see—and smell—my friend has had a strenuous time. We'll lodge him in the Low Room. Bring refreshments immediately; water as soon as you can heat a decent amount, with washcloth and towel; clean garb. Is the bed made up?"

"It always is, master." The slave sounded a bit hurt. He considered. "As for raiment, yours will not fit. I'll borrow from Durig. Shall I then purchase some?"

"Hold off on that," Lugo decided. He might need all the cash he could scrape together in a hurry. Though not the debased small stuff. That was too bulky; one gold solidus equaled about

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fourteen thousand nummi. "Durig's our handyman," he explained to Rufus. "Otherwise we boast a gifted cook and a couple of maids. A modest household." Homely details might soothe. He wanted Rufus fit to answer questions as soon as might be.

From the entry they passed into the atrium. It was a pleasant room, equally unpretentious, lighted by sunshine that the leaded windows turned greenish. A mosaic at the center of the floor tiles depicted a panther surrounded by peacocks. Wooden panels set into the walls bore motifs more current, the Fish and Chi Rho among flowers, a large-eyed Good Shepherd. Since the reign of Constantine the Great it had been increasingly expedient to profess Christianity, which hereabouts had better be of the Catholic sort. Lugo remained a catechumen; baptism would have laid inconvenient obligations on him. Most believers put it off till late in life.

His wife had heard and came to meet him. "Welcome, dear," she said happily. "You're back fast." Her gaze fell on Rufus and grew troubled.

"This man and I have urgent business," Lugo told her. "It is highly confidential. Do you understand?"

She swallowed but nodded. "Hail and welcome," she greeted in a subdued voice.

Brave girl, Lugo thought. It was hard to look away from her. Cordelia was nineteen, short but deliciously rounded, her features delicate and lips always slightly parted below a lustrous mass of brown hair. They had been married four years and she had borne him two children thus far, both still alive. The marriage brought him certain useful connections, her father being a curial, though no dowry worth mentioning, the curial class being crushed between taxes and civic duties. More important to the couple, they had been drawn to each other, and wedlock became an ever higher delight.

"Marcus, meet Cordelia, my wife," Lugo said. That was a safely frequent name. Rufus bobbed his head and grunted. To her: "We must get busy at once. Perseus will see to the necessities. I'll join you when I can."

She stared after them as he guided his companion off. Did he hear her sigh? Abrupt fear stabbed. He had gone forth with hope aflutter in him, a hope so wild that he must keep denying it, scolding himself for it. Now he saw what the reality might lead to.

No, he would not think about that. Not immediately. One step, two steps, left foot, right foot, that was how to march through time.

The Low Room was downstairs, a part of the cellar that Lugo had had bricked off after he acquired this house. Such hideaways were common enough to draw scant attention. Often they were for prayer or private austerities. In Lugo's line of work, it was clear that he could have use for a place secure from eavesdroppers. The cell was about ten feet square and six high. Three tiny windows just under the ceiling gave on the peristyle garden at ground level. The glass in them was so thick and wavy as to block vision, but the light that seeped through met whitewashed walls, making the gloom not too dense at this moment. Tallow candles lay on a shelf beside flint, steel, and tinder. Furnish-

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ings were a single bed, a stool, and a chamber pot on the dirt floor.

"Sit down," Lugo invited. "Rest. You're safe, my friend, safe."

Rufus hunched on the stool. He threw back the cowl but clutched the mantle around his tunic; the place was chilly. His red head lifted with a forlorn defiance. "Who the muck be you, anyhow?" he growled.

His host lounged back against the wall and smiled. "Flavius Lugo," he said. "And you, I believe, are a shipyard carpenter, unemployed, generally called Rufus. What's your real name?"

An obscenity was followed by: "What's it matter to you?"

Lugo shrugged. "Little or nothing, I suppose. You could be more gracious toward me. That rabble would have had the life out of you."

"And what's that to you?" The retort was harsh. "Why'd you step in? Look here, I be no sorcerer. I want naught to do with magic or heathendom, me, a good Christian, a free Roman citizen."

Lugo lifted a brow. "Have you absolutely never made an offering elsewhere than in church?" he murmured.

"Well, uh, well—Epona, when my wife was dying—" Rufus half rose. He bristled. "Dung o' Cernunnos! *Be* you a sorcerer?"

Lugo raised a palm. His left hand moved the staff, slightly but meaningfully. "I am not. Nor can I read your mind. However, old ways die hard, even in the cities, and the countryside is mostly pagan and from your looks and speech I'd guess your family were Cadurci a generation or two ago, back in the hills above the Duranius Valley."

Rufus lowered himself. For a minute he breathed hard. Then, piece by piece, he began to relax. A smile of sorts responded to Lugo's. "My parents come o' that tribe," he rumbled. "My right name, uh, Cotuadun. Nobody calls me aught but Rufus anymore. You be a sharp 'un."

"I make my living at it."

"No Gaul you. Anybody might be a Flavius, but what's 'Lugo'? Where you from?"

"I've been settled in Burdigala a fair number of years." A knock on the plank door was handily timed. "Ah, here comes the excellent Perseus with those refreshments I ordered. I daresay you've slightly more need of them than I do."

The majordomo brought a tray of wine and water flagons, cups, bread, cheese, olives in a bowl. He put it on the ground and, at Lugo's wave, departed, closing the door behind him. Lugo sat down on the bed, reached, poured, offered Rufus a drink not much diluted. His own he watered well.

"Your health," he proposed. "You pretty near lost it today."

Rufus took a long swallow. "Ahhh! Bugger me if that don't go good." He squinted through the dusk at his rescuer. "Why'd you do it? What be I to you?"

"Well, if nothing else, those proles had no right to kill you. That's the job of the state, after you've duly been found guilty—which I am sure you are not. It behooved me to enforce the law."

"You knew me."

Lugo sipped. The wine was Falernian, sweet on his tongue. "I knew of you," he said. "Rumors had reached me. That's natural. I keep track of what's going on. I have my agents.

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Nothing to frighten you, no secret informers. But street urchins, for example, who earn a coin by bringing me word of anything interesting. I determined to seek you out and learn more. It's lucky for you that that chanced to be exactly when and where I could snatch you from your fellow sons of toil."

The question soughed through him: How many chances had he missed, by what slender margins, throughout all the years? He did not share the widespread present day faith in astrology. It seemed likeliest to him that sheer accident ruled the world. Perhaps today the dice had been due to roll in his favor.

If the game was real. *If* anyone like him existed, had ever existed, anywhere under the sky.

Rufus's head thrust forward from the heavy shoulders. "Why did you?" he grated. "What the dung be you after?"

He needed calming down. Lugo checkreined the eagerness within himself that was half fear. "Drink your wine," he said. "Listen, and I'll explain.

"This house may have led you to think I'm a curial, or a mildly prosperous shopkeeper, or something of that kind. I'm not." Had not been for a long while. Diocletian's decree had supposedly frozen everybody into the status to which they were born, including the middle classes. But rather than be crushed, grain by grain, between the stones of taxation, regulation, worthless currency, moribund trade: more and more were fleeing. They slipped off, changed their names, became serfs or outright slaves, illegal itinerant laborers and mountebanks; some joined the Bacaudae whose bandit gangs terrorized the rural outback, some actually sought to the barbarians. Lugo had made better arrangements for himself, well in advance of need. He was accustomed to looking ahead.

"I'm currently in the pay of one Aurelian, a senator in this city," he went on.

Hostility sparked. "I heard about him."

Lugo shrugged again. "So he bribed his way into that rank, and even among his colleagues is monumentally corrupt. What of it? He's an able man and understands that it's wise to be loyal to those who serve him. Senators aren't allowed to engage in commerce, you may know, but he has varied interests. That calls for intermediaries who are not mere figureheads. I come and go for him, to and fro, sniffing out dangers and possibilities, bearing messages, executing tasks that require discretion, giving advice when appropriate. There are worse stations in life. In fact, there are less honorable ones."

"What's Aurelian want with me?" Rufus asked uneasily.

"Nothing. He's never heard of you. Fate willing, he never shall. I sought you out on my own account. We may be of very great value to each other." Lugo sharpened his tone. "I make no threats. If we cannot work together but you have done your best to cooperate with me, I can at least get you smuggled out of Burdigala to someplace where you can start over. Remember, you owe me your life. If I abandon you, you're a dead man."

Sullenness and the gesture of the fig: "They'll know you hid me here."

"Why, I'll tell them myself," Lugo

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declared coolly. "As a solid citizen, I did not want you unlawfully slaughtered, but I did feel it incumbent on me to interview you in private, draw you out—Hold!" He had set his cup on the ground as he talked, expecting Rufus might lunge. Now he gripped the staff in both hands. "Stay right on that stool, boy. You're sturdy, but you've seen what I can do with this."

Rufus crouched back.

Lugo laughed. "That's better. Don't be so damned edgy. I really don't want to cause you any harm. Let me repeat, if you'll be honest with me and do as I say, the worst that will happen to you is that you leave Burdigala in disguise. Aurelian owns a huge latifundium; it can doubtless use an extra workman, if I put in a good word, and the senator will cover up any little irregularities for me. At best—well, I don't yet know, and therefore won't make any promises, but it could be glorious beyond your highest-flying childhood dreams, Rufus."

His words and the lulling tone worked. Also, the wine had begun to. Rufus sat quiet a moment, nodded, beamed, tossed off his drink, held out a hand. "By the Three, right?" he cried.

Lugo clasped the hard palm. The gesture was fairly new in Gallia, maybe learned from Germanic immigrants. "Splendid," he said. "Just speak fully and frankly. I know that won't be easy, but remember, I have my reasons. I mean to do well by you, as well as God allows."

He refilled the emptied cup. Behind his jovial façade, tension gathered and gathered.

Rufus drank. His vessel wobbled. "What d'you want to know?" he asked.

"First, why you got into grief."

Rufus's pleasure faded. He scowled beyond his questioner. "Because my wife died," he mumbled. "That's what broke the crock."

"Many men are widowed," Lugo said, while memory twisted a sword inside him.

The big hand tightened around the cup till knuckles stood white. "My Livia was old. White hair, wrinkles, no teeth. We'd two kids what grew up, boy and girl. They be married, kids o' their own. And they've gone gray."

"I thought this might be," Lugo whispered, not in Latin. "O Ashtoreth—"

Aloud, using today's language: "The rumors that reached me suggested as much. That's why I came after you. When were you born, Rufus?"

"How the muck should I know?" The response was surly. "Balls! Poor folk don't keep count like you rich 'uns. I couldn't tell you who be consul this year, let alone then was. But my Livia was young like me when we got hitched—fourteen, fifteen, whatever. She was a strong mare, she was, popped her young out like melon seeds, though only the two o' them got to grow up. She didn't break down fast like some mares."

"You may well have reached your threescore and ten, then, or gone beyond," Lugo said most softly. "You don't look a day over twenty-five. Were you ever sick?"

"No, 'less you count a couple times I got hurt. Bad hurts, but they healed right up in a few days, not so much as a scar. No toothaches ever. I got three teeth knocked out in a fight once, and

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they grew back." The arrogance shriveled. "People looked at me more and more slanty. When Livia died, that broke the crock." Rufus groaned. "They'd been saying I must've made a deal with the Devil. *She* told me what she heard. But what the muck could I do? God give me a strong body, that's all. She believed."

"I do, Rufus."

"When she fell bad sick at last, not many 'ud speak to me anymore. They'd shy from me in the street, make signs, spit on their breasts. I went to a priest. He was scared o' me too, I could see it. Said I ought to go to the bishop, but the bastard stalled about taking me to him. Then Livia died."

"A release," Lugo could not help venturing.

"Well, I'd gone to a whorehouse for a long time," Rufus answered matter-of-factly. Fury flared. "Now they, them bitches, they told me go away and don't come back. I got mad, raised a ruckus. People heard and gathered around outside. When I came out, the scumswine yelled at me. I decked the loudest mouthed o' them. Next thing I knew, they were on me. I barely fought free and ran. They came after me, more and more o' them."

"And you'd have died under their feet," Lugo said. "Or else presently the rumors would have reached the prefect. The tale of a man who never grew old and was clearly no saint, therefore must be in league with the diabolical. You'd have been arrested, interrogated under torture, doubtless beheaded. These are bad times. Nobody knows what to expect. Will the barbarians prevail? Will we have another civil war? Will plague or famine or a total collapse of trade destroy us? Heretics and sorcerers are objects to take fear out on."

"I be none!"

"I didn't say you were. I accept you're a common man, as common as I've ever met, aside from—Tell me, have you known or heard of anyone else like you, whom time doesn't appear to touch? Kinfolk, perhaps?"

Rufus shook his head.

Lugo sighed. "Neither have I." He mustered resolve and plunged forward. "And I have waited and tried, searched and endured, since first I came to understand."

"Uh?" The wine splashed from Rufus's cup.

Lugo sipped out of his own, for what comfort it could give. "How old do you think I am?" he asked.

Rufus peered before he said at the bottom of his throat: "You look maybe twenty-five."

A smile quirked on the left side of Lugo's mouth. "Like you, I don't know my age for certain," he answered slowly. "But Hiram was king in Tyre when I was born there. What chronicles I have since been able to study and figure from show me that that was about twelve centuries ago."

Rufus gaped. The freckles stood lurid on a skin gone white. His free hand made a sign.

"Don't be afraid," Lugo urged. "I'm in no pact with darkness. Or with Heaven, for that matter, or any power, any soul. I am merely your kind of flesh, whatever that means. I have simply been longer on earth. It is lonely. You have had the barest foretaste of how lonely it is."

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He rose, leaving staff and cup, to pace the cramped floor, hands behind back. "I was not born Flavius Lugo, of course," he said. "That is only the latest name I have taken out of—I've lost count of how many. The earliest was—never mind. A Phoenician name. I was a merchant until the years brought me to trouble much like yours today. Then for a long time I was a sailor, a caravan guard, a mercenary soldier, a wandering bard, any number of trades in which a man may come and go little noticed. That was a hard school I went through. Often I came near dying from wounds, shipwreck, hunger, thirst, a dozen different perils. Sometimes I would have died, were it not for the strange vigor of this body. A slower danger, more frightening as I began to perceive it, was that of drowning, losing my reason, in sheer memories. For a while I did have scant use of my wits. In a way that was a mercy; it blunted the pain of losing everyone I came to care for, losing him and losing her and losing, oh, the children. . . . Bit by bit I worked out the art of memory. I now have clear recall, I am like a walking library of Alexandria—no, that burned, didn't it?" He chuckled at himself. "I do make slips. But I have the art of storing what I know until it's wanted, then calling it forth. I have the art of controlling sorrow. I have—"

He observed Rufus's awed regard and broke off. "Twelve hundred years?" the artisan breathed. "You seen the *Savior?*"

Lugo forced a smile. "Sorry, I have not. If he was born in the reign of Augustus, as they say—that would have been, m-m, between three and four hundred years ago—then I was in Britannia at the time. Rome hadn't conquered it yet, but trade was brisk and the southern tribes were cultured in their fashion. And much less meddlesome. That's always a highly desirable feature in a place. Damnably hard to find these days, short of running off to the wild Germanni or Scoti or whatever. And even they—

"Another art I've developed is that of aging my appearance. Hair powder, dyes, such things are cumbersome, unreliable. I let everybody talk about how young I continue to look. Some people do, after all. But meanwhile gradually I begin to stoop a little, shuffle a little, cough, pretend to be hard of hearing, complain of aches and pains and the insolence of modern youth. It only works up to a point, of course. Finally I must vanish and start a new life elsewhere under a new name. I try to arrange things so it will be reasonable to suppose I wandered off and met with misfortune, perhaps because I'd grown old and absent-minded. And as a rule I've been able to prepare for the move. Accumulate a hoard of gold, learn about the home to be, perhaps visit it and establish my fresh identity—"

Some of the weariness of the centuries fell over him. "Details, details." He stopped and looked into one of the blind windows. "Am I going senile? I don't usually gabble this way. Well, you're the first like me I've found, Rufus, the very first. Let's hope you won't be the last."

"Did you, uh, know about others?" groped the voice at his back.

Lugo shook his head. "I told you I never did. How could I? A few times

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I thought I saw a trace, but it gave out or it proved false. Once I may have. I'm not sure."

"What was that, . . . master? You want to tell me?"

"I may as well. It was in Syracuse, where I based myself for a good many years because of its ties with Carthage. Lovely, lively city. A woman, Althea was her name, fine to look on and bright in the way women sometimes got to be in the later days of the Greek colonies—I knew her and her husband. He was a shipping magnate and I skippered a tramp freighter. They'd been married for over three decades, he'd gone bald and pot-bellied, she'd borne him a dozen children and the oldest of them was gray, but she might have been a maiden in springtime."

Lugo fell silent a while before finishing, flat-voiced: "The Romans captured the city. Sacked it. I was absent. Always make an excuse to clear out when you see that kind of thing coming. When I returned, I inquired. She could have been taken for a slave. I could have tried to find her and buy her free. But no, when I'd tracked down somebody who knew, insignificant enough to've been left unhurt, I learned she was dead. Raped to death, I heard. Don't know if that's true or not. Stories grow in the telling. No matter. It was long ago."

"Too bad. You should'a got in there first." Lugo tautened. "Uh, sorry, master," Rufus said. "You don't, uh, don't seem to hate Rome."

"Why should I? It's eternally the same tale, war, tyranny, massacre, slavery. I've been party to it myself. Now Rome is on the receiving end."

"What?" Rufus sounded aghast. "Can't be! Rome is *forever!*"

"As you like." Lugo turned back to him. "Apparently I have, at last, found a fellow immortal. At least, here is someone I can safeguard, watch, make certain of. Two or three decades should suffice. Though already I have no real doubt."

He drew breath. "Do you see what this means? No, you scarcely can. You've had no time to think about it." He surveyed heavy visage, low forehead, dismay yielding to a loose-lipped glee. I don't expect you ever will, he thought. You are a moderately competent woodworker, nothing else. And I'm lucky to have found this much. Unless Althea—but she slipped through my fingers, away into death.

"It means I am not unique," Lugo said. "If there are two of us, there must be more. Very few, very seldom born. It isn't in the bloodlines, like height or coloring or those deformities I've seen run in families. Whatever the cause is, it happens by accident. Or by God's will, if you prefer, though I'd think that makes God out to be sheerly capricious. And surely senseless mischance takes off many immortals young, as it takes off ordinary men and women and children. Sickness we may escape, but not the sword or the runaway horse or the flood or the fire or the famine or whatever. Possibly more die at the hands of neighbors who think this must be a demon, magician, monster."

Rufus cowered. "My head's all a-spin," he whimpered.

"Well, you've had a bad time. Immortals need rest too. Sleep if you wish."

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Rufus's expression was glazing over. "Why couldn't we say we was, uh, saints? Angels?"

"How far would you have gotten?" Lugo gibed. "Conceivably a man born into royalty—But I don't suppose that's ever happened, as rare as our kind must be. No, if we survive, we learn early on to keep our heads low."

"Then how shall we find each other?"

Rufus hiccoughed and farted.

"Come out with me into the peristyle," said Lugo.

"Oh, gladly," Cordelia sang. Almost, she danced at his side.

It was an evening mild and clear. The moon stood over the eastern roof, close to full, in a sky still violet-blue. Westward, heaven darkened and stars trembled forth. City sounds had mostly died out; crickets chirred. Moonlight dappled the flowerbeds, shivered on the water of the impluvium, brought Cordelia's young face and breast out of shadow into argency.

She and he stood hand in hand a few minutes. "You were so busy today," she said at length. "When you came back early, I hoped—Of course, you had your work to do."

"I did that, unfortunately," he replied. "But these next hours belong to us."

She leaned against him. Her hair carried a remnant fragrance of sunlight. "Christians should give thanks for what they get." She giggled. "How easy to be a Christian, tonight."

"How have the children done today?" he asked—his son Julius, no longer stumping about but leaping adventurously everywhere, starting to talk; little, little Rosa asleep in her crib, starfish hands curled tight.

"Why, very well," said Cordelia, a bit surprised.

"I see them too seldom."

"And you care. Not many fathers do. Not that much." She squeezed his hand. "I want to give you lots of children." Impishly: "We can begin at once."

"I have . . . tried to be kind."

She heard how the words dragged, let go of him, widened her eyes in alarm. "What's wrong, beloved?"

He made himself take hold of her shoulders, look into her face—the moonlight made her searingly beautiful—and answer: "Between us, nothing at all." Only the fact that you will grow old and die. And that has happened so often, so often. I cannot count the deaths. There is no measure for the pain, but I think it has not grown any less; I think I have merely learned to live with it, as a mortal can learn to live with an unhealable wound. I thought we could have, oh, thirty, perhaps forty years together before I must leave. That would have been wonderful.

"But I have an unexpected journey to make," he said.

"Something that man—Marcus—something he's told you?"

Lugo nodded.

Cordelia grimaced. "I don't like him. Forgive me, but I don't. He's coarse and stupid."

"He is that," Lugo agreed. It had seemed wise to him that they let Rufus share their supper. Confinement in the Low Room with nothing but his dreads and animal hopes for company had been breaking what self-control was left him, and he needed it for the time ahead.

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"Nevertheless, I got important information from him."

"Can you tell me what it is?" He heard how hard she tried not to make it a plea.

"I'm sorry, no. Nor can I say where I'm bound or how long I'll be gone."

She caught both his hands. Her fingers had turned cold. "The barbarians. Pirates. Bacaudae."

"Travel has its dangers," he admitted. "I've spent a lot of this day making arrangements for you. Just in case, darling, just in case." He kissed her. The lips that shivered beneath his bore a thin taste of salt. "You should know this is a matter that may or may not concern Aurelian, but if it does, it must be investigated at once, and he's in Italy. I've told his amanuensis Corbilo as much, and you can collect my pay for your needs from him. I've also left a substantial sum in trust for you at the church. The priest Antoninus took it and gave me a receipt that I'll give you. And you are heir to this property. You'll be all right, you and the children." If Rome hangs together.

She threw herself against him and clung. He stroked her hair, her back, ruffling the gown, making the caress an embrace. "There, there," he crooned, "this is just in case. Don't be afraid. I'm not running any great risk." He believed that was true. "I'll be back." That was not true, and hurt like fire to utter. Well, no doubt she'd marry again, after he was given up for dead. *Last heard of on the Ordovician coast, about when a Scotic raid occurred. . . .*

She stood back, hugged herself, swallowed, smiled unsteadily. "Of course you w-w-will," she avowed. "I'll p-pray for you the whole while. And we have this night."

Until shortly after dawn, when *Nereid* cast off. He'd obtained passage for himself and Rufus. Most of Britannia continued secure, but the barbarians ravaged enough of it that nobody would question a couple of men who appeared in, say, Aquae Sulis or Augusta Londinium with a story of having fled. Given money in hand, they could start afresh; and Lugo had buried a fair supply of honest coins in the island, several generations back.

"If only you could remain," escaped from Cordelia.

"If only I could." But Rufus was marked in Burdigala.

Rufus, the male, the oaf, the immortal, who would surely perish miserably without an intelligent man in charge of him. And he must not. However awkward, his was the only help Lugo had toward the ultimate coming together of their kind.

Cordelia heard how the words wrenched themselves from her husband's mouth. "I will *not* whine," she declared. "We do have this night. And many, many more on the far side of your journey. I'll wait for you, I'll always wait."

No, Lugo thought, you won't. That wouldn't make sense, once you've decided you're a widow, still young but with time at your heels.

Nor could you ever have waited for me always.

I seek for her who shall never have to leave me. ■

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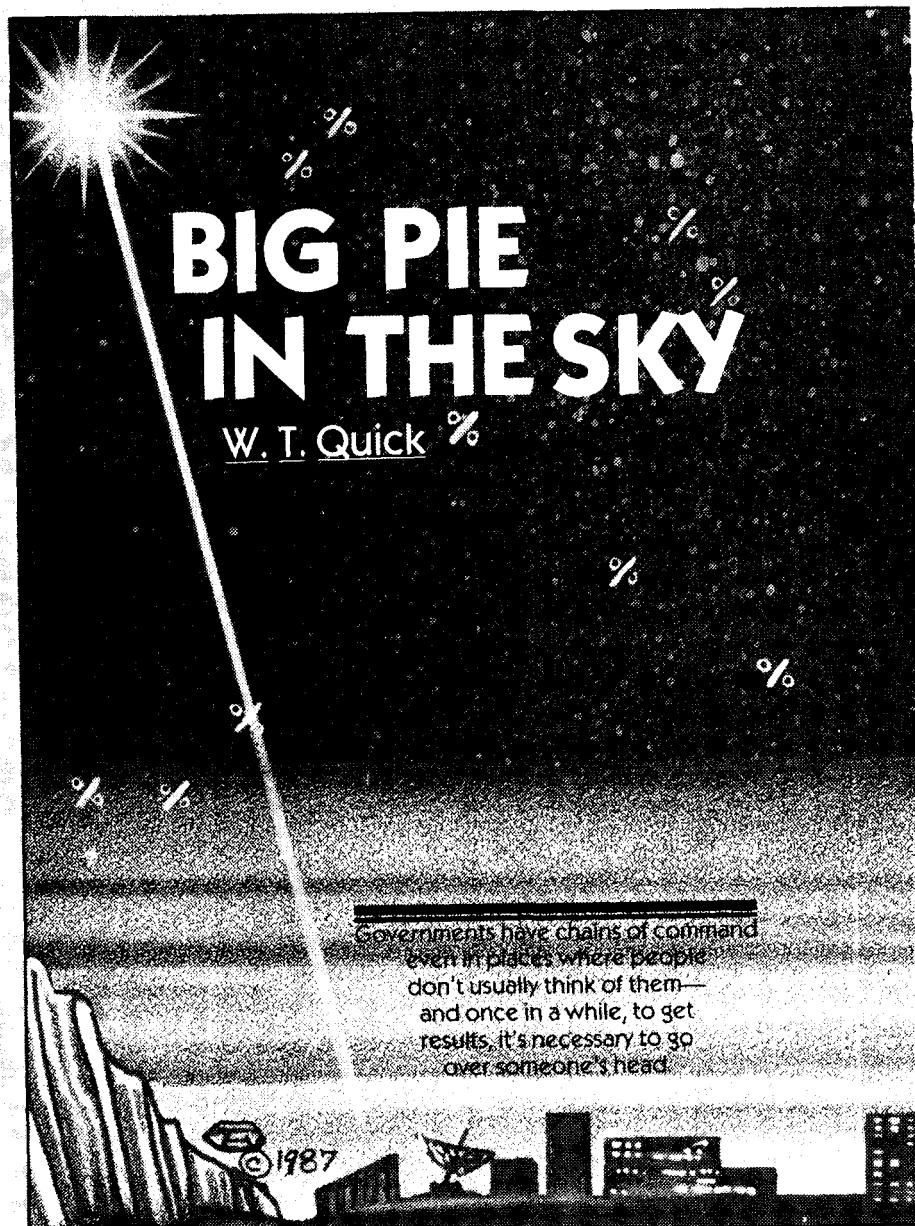
BIG PIE
IN THE SKY
W. T. Quick
Governments have chains of command even in places where people don't usually think of them—and once in a while, to get results, it's necessary to go over someone's head.
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Lawrence Schollander stared at the highly polished tips of his black shoes and wondered just how bad the reaming would be. It had to be a reaming, of course. B.J. Titus was conspicuously ignoring him, shuffling papers on the top of his immaculate black marble desk top, clearing his throat every two or three seconds, occasionally glancing at a spot behind and to the right of Schollander's head, so that the indirect fluorescents made his steel-rimmed glasses as blank as holes in a winter lake. His iron gray brush cut looked as if it had been done with a microtome. It was very quiet in the luxurious corner office on the twenty-ninth floor of the building. The room smelled faintly of refrigerated, filtered air.

Fifty-five years old. If my gut gets any bigger, I won't be able to see my shoes. Seven hundred thousand a year and perks. That's a good reason to put up with this bullshit. I need to get more exercise. Hell, I need to get any exercise. I wonder who screwed up this time. I can't afford to lose this shot. You don't start over at my age, not in this business. Any business. My hair is brown, my hair is gray, my hair is falling out. Christ, I hope my ulcer doesn't flare up again.

"Larry, we have a problem."

Schollander stared at his boss. He nodded. *You mean I have a problem,* he thought. "What sort of problem, B.J.?"

"How much capital are we in for right now?"

"Mm." Schollander hauled out his quikpak and tapped the tiny keyboard thoughtfully. "Indonesia committed on thirty billion just a few days ago. That gives us a hair over three hundred billion all together." He looked up. "Of course it's mostly paper. Promises and pledges. Nobody's really coming in until Congress makes up its mind."

Titus's eyes went blank and glassy again. "Uh huh. And if something happens so that those assholes on the Hill don't pass that loan appropriation for us?"

"I'm out of a job," Schollander said. "Uh, so are you. So is everybody. Consort goes down the tubes is what happens." He flicked down the quikpak's miniature screen. "Not to worry, though. Congress is a lock. You know it and so do I. They've got no choice. Either we go into space, or the Japanese do. And actually, the Japanese can't go it alone. Not well, at least. There aren't any other options."

Titus stared at him. "Somebody is giving them options. Other options, Larry. Why don't you know about that? You're my executive vice-president. You're in charge of twisting arms, so how come you don't know when somebody else starts twisting on our turf? Don't I pay you enough to know things like that?"

Schollander forced his face to remain impassive, even though it felt like an army of ants was clog-dancing on his spinal cord. Stay cool and roll with the punch, he told himself.

"I screwed up, is that what you're saying?" He stared at Titus. "Could be. If so, I'll fix it. But what are you talking about, B.J.? I spoke with Senator Whetfeldt this morning. Nothing was happening."

Titus's soft tenor remained unchanged and Schollander shivered. Ti-

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tus would cut off your balls and hand them to you without even raising his voice. He was famous for that. "I pay you to know, Larry. Something is going on, so why don't you go find out what?"

Schollander leaned forward on the sofa until his hands rested on his knees and then, inhaling sharply, pushed himself upright. "You want it, you got it, B.J." He walked around the sofa and went to the door. "Anything else?"

B.J. was already back at work. He glanced up, and for a moment his eyes gleamed like silver coins. "Just do your job, Larry. Earn your money. When you've got a handle on it, come back and see me."

"Right." Schollander opened the door.

"Uh, Larry?"

"Yes?"

"Be real fast on this, would you?"

"Yes," Schollander said. "I will."

The quikpak started squawking at him not ten feet down the hall from Titus's office. He stopped and lifted the small unit from his belt.

"Yes?"

The deceptively cheerful, round face of his executive assistant, Bobby Hilkind, appeared on the screen. "You still in one piece?" he asked.

"Sort of. I don't want to talk about it right now. Meet me in my office in five minutes."

"Gotcha." Hilkind's face blinked off the screen. Schollander sighed and leaned against the wall and looked at the ceiling. Then he thought about the picture *that* made, stepped forward, straightened his shoulders, and walked briskly away. He couldn't quite bring himself to whistle, though. That would have been too much.

"We got problems, is that right?" Robert "Bullet Bobby" Hilkind's voice was as thick and drawling as sweet potato pie, his favorite dessert. More than one opponent had mistaken his honeyed southern accent as evidence of an equally slow mind; their scalps adorned his private mental trophy wall.

He was a misleading man. His black hair had been a sandy, washed out brown until he'd had some implant work done. His eyes appeared mild and blue, almost vague, but his vision was better than twenty-twenty. His face was rotund and seemed ill-matched to his whippet-lean frame. People thought he was fat until they looked closer. Only the few regular opponents at his handball club knew just how fanatically Hilkind kept himself in shape, one more testament to his firmly held belief that a man could do anything, could *overcome* anything he really wanted to.

Lawrence Schollander was his rabbi, his protector and benefactor in the knife-slash corporate ghettos, and Bullet Bobby had convinced himself he would do anything for his boss. Sometimes he even thought Schollander might believe it was true.

"I got problems, you got problems, and crap rolls downhill." Schollander shrugged. "What else is new?"

"I brought my umbrella, boss. What's crawled up B.J.'s rear this time?"

Schollander was seated behind his own desk, a granite-topped affair almost as large as Titus's, just as his office, though slightly smaller, was also a corner suite with a sweeping view of the

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San Francisco skyline and the Bay beyond.

"When was the last time this dump was swept?"

"This morning. No bugs, not even one from B.J."

Schollander sighed. Maybe this conversation would remain confidential. And maybe not.

"He says something's screwed up with Congress. Our appropriations deals are in trouble, something like that. He didn't give me any details. But he's in a hurry, and he's worried. So that makes me worry, and therefore—"

"Right. I worry too. You want me to make anybody else worry, or am I a nice guy?"

Schollander leaned back in his chair, crossed his arms over his chest—where did that flab come from?—and squinted down the bridge of his nose. "We got three hundred billion dollars and the entire Consort Laser Launch program at risk here. If Congress doesn't come through with their hundred big ones, we don't have a company. What do you think? Be nice. If that doesn't work, kick ass. But find out what B.J.'s so shook up about."

Hilkind hoisted himself from the black leather chair in front of the desk. "I assume we're in a hurry?"

"Yesterday would be fine, Bobby," Schollander said mildly. "Last Monday would be even better."

As soon as Hilkind left, Schollander leaned forward and ran his fingers across the touchpad inset into the surface of his desk. A thirty-inch screen popped up from the surface and figures began to scroll down. Schollander scanned the data, all of it recent, looking for anything that might be a clue to B.J.'s sudden quiet tantrum.

Nothing. Everything was in order. The biggest appropriations bill in space research history was still poised at the top of the congressional hill, slated to roll down its greased pathway straight to the president's desk, where that pathetic ex-preacher waited eagerly to sign it.

He rubbed his temples and tried to think of anything else. It was simple enough. He'd worked on this project almost two years now, putting in seventy, eighty hour weeks, living on planes and in hotels, drinking too much cheap booze and breathing other people's cigar smoke, smiling till his jaws hurt, and spending money like water. This was his chance to get out, to finally grab the brass ring. He wondered what it would be like to have *big* money. With operations like this, there was always an opportunity for some hanky-panky with a stock deal, some little insider thing tossed out as a crumb for a job well done. He knew it would come, if he was patient, and everything went right. And when it *did* come he would be ready.

B.J. had hired him because he was the best. His deal making sense was extraordinary, and that was true, not hype, he told himself. When Hyundai and General Electric Motors and QuadGen Research had pooled a billion bucks to create the Corsortium, they hadn't done any screwing around. B.J. Titus had given up his CEO slot at GEM to come onboard the new company, and that was enough to immediately give Consort legitimacy. B.J. had saved

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GEM in the Oslo stock wars, and stepping down to a billion dollar midget after his triumphs at the two hundred billion dollar techno-behemoth was a signal for anybody who cared to listen.

Schollander listened. The salary caught him first, and his nose for the center of things. Then the dream lifted him up and swept him away.

The United States in the year 2020 was nowhere near the over polluted, underproductive, immigrant-swamped cesspool that had been predicted thirty years before. Nevertheless, aside from a few satellite labs, a tiny Soviet lunar outpost, and a swarm of mlitary projects, mankind had little presence outside his own atmosphere.

Consort proposed to change that. The government could not simply fund the necessary projects on its own. NASA seemed incapable of putting together a program that didn't involve spectacular, media-juicy crashes and wholesale astronaut death. If the United States was going to space, was going after the Asteroids and the power and the new technologies, then corporations would have to do it.

And the money, Schollander reminded himself. If Consort got the Laser Launcher built, the money would be incredible. Just frigging incredible. B.J., of course, never forgot. Not for an instant. But that was why he was B.J. Titus, corporate warlord.

You didn't run a hundred billion dollar pork barrel through Congress without a lot of grease, and that was what Schollander did—spread grease.

He contemplated his stomach again, and decided he had to visit his tailor. His measurements needed a little revision. You *eat* a lot of grease on the handout circuit, too.

He slapped the touchpad and watched the viewscreen disappear. That appropriation bill was the key to everything. But it was bought and paid for. So what the hell was the problem?

A sharp pain lanced through his belly. Sighing, he opened his desk drawer and reached for the Maalox.

Then he reached for the phone.

"Jake? How you doing?"

The desk screen showed the wattled, droopy-jowled, coon-dog visage of the Solid South's most famous son, the senior senator from Huntsville, Alabama.

Jackson Belleau Whetfeldt let his lids slide lazily down over innocent brown eyes.

"Well, Larry, my friend, I believe I'm just about the same as when I talked with you only two hours ago. Why? You expecting some kind of change since then?"

"I don't know. Has there been a change?"

The eyelids sagged further. A huge Cuban cigar journeyed into the screen, landed between the Senator's thick, rubbery lips, then disappeared in a sudden blue cloud.

"Funny you should ask that, Larry. As a matter of fact, the climate around here's gotten a bit uncertain. All of a sudden like, you understand what I mean?"

The Maalox began to lose its holding action in Schollander's stomach. "Uh."

"Larry? You all right, boy?"

"A little pain, Senator. You know how it goes."

Whetfeldt nodded sympathetically.

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"I'm real sorry about that." His lips moved and another smokescreen obscured his face.

"Senator, you want to be a little bit more precise, maybe? I mean about this sudden weather change? A thing like that, why it can help this pain, or could make it worse, depending." Schollander hated himself when he slipped into Whetfeldt's sly country-boy speaking style, but he couldn't help it.

The senator lowered his cigar. When he spoke again, his voice was quicker, more precise. "We knew it was gonna happen, Larry. It's the Japs. They finally stepped in, and they brought gifts. They brought a whole big basket of carrots, and I bet they also brought a stick or two, although I haven't heard about any yet."

Schollander chewed up a Maalox dry and swallowed it. "I figured it was too good to last. Okay, let me have it all. Who and what and whatever."

"Mitsu Fujiwara," Whetfeldt said succinctly. "I believe I can let you fill in any further blanks?"

"Oh, shit," Schollander said.

"Uh huh. Me, too," the senator replied.

"Mitsu Fujiwara," Bobby Hilkind said.

"Yeah. I heard already."

"So that's why you look like that."

"Like what?"

"Like you got run over by a Maalox truck."

The two men regarded each other through a thick silver haze. Reflexively, Schollander reached for another cigarette. Guaranteed non-carcinogenic, but they made your throat feel like an acid bath if you smoked too many. He lit up and waited for the coughing spell to pass.

"So what," he said, "is that wily Nipponese sonofabitch doing to me?"

His assistant rubbed his nose and looked at the floor. "The usual. A senator here, a congressman there, your basic social lobbyist or two. That's not the problem. The problem is he's here in the first place. Which means MITI has taken a hand, which means the Japanese government has finally decided to get involved."

"Yeah. I read it that way too."

"You want me to kill him?"

It sounded like a joke, but Schollander knew better. Even so, he actually gave it a moment of thought before he shook his head. "No. Wouldn't do any good. What's our schedule right now?"

"House and Senate vote on the same day. The bill goes to Joint for a reading and they split all differences and shovel it right on to President Hardy. The old goof signs, hands out free pens all around and we get on with the business at hand."

"Can our good buddy Mitsu screw up that timetable?"

Hilkind interlaced his fingers and squeezed, cracking each knuckle one by one. Schollander winced.

"Probably," Hilkind said at last. "Mighty MITI doesn't walk all that soft, and they've got as big a stick as anybody."

Schollander leaned back in his chair. MITI. The Japanese Ministry of International Trade and Industry scared the hell out of him. Unlike the Americans and their free-wheeling cowboy corporations, the Japanese believed in order.

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And so MITI coordinated the efforts of the Japanese industrial giants, the Matsushitas and the Mitsubishis and the great Tokyo banks, helping here and restraining there, so that government and industry spoke and acted as one. Now Mitsu Fujiwara, thirty-five-year-old scion of Imperial blood and second assistant director of MITI, was in Washington, spreading largesse and no doubt a threat or two. It could be very dangerous.

"But *why?*" Schollander exploded finally. "They know they can't do it by themselves, and we've offered them a piece of the pie."

"Maybe they want a bigger piece?"

"You asking me? I thought you got paid so I could ask you the questions."

"Oh, pardon the hell out of me, massa. I'll get right on it."

"As a great man once said to me, earlier today I think it was, be real fast."

"On my way. Uh, Larry?"

"What?"

"I still think it would be simpler to kill him."

"Who ever told you life was simple?"

The drive home was hell. Schollander fumed in his Chrysler AeroVironment Dart, drumming his fingers on the wheel as he inched slowly across the upper deck of the Golden Gate Bridge. The old girl seemed to groan beneath the awesome weight of two extra levels of cars. Ahead lay the almost certain gridlock of the Marin pad approaches.

Grunting, he began to play the touchpad of his onboard computer, first punching for vocal commands; then he told the machine his home phone number and inserted a message that he'd be late. Again. Carefully, he made certain that the message went into the family bulletin board without a verbal "pick-me-up" code—he didn't really feel like discussing his errant ways with his wife, Elizabeth. She'd already had much to say on that subject when he'd missed the Carter's dinner earlier in the week.

In fact, Elizabeth had much to say about a lot of things lately. Both kids were out of college now, on their own. And she sat at home, waiting for a husband who habitually crammed two normal workdays into each twenty-four hours. What did she do? he wondered, realizing uncomfortably that his wife's world was as alien to him as those of his children. The money, he thought, when I get the money I retire. Maybe we can become a couple again. Maybe I can be married again. We could travel. She would quit whining. She would quit—what? Another man?

He thrust *that* thought away and turned to Mitsu Fujiwara. He called up his own background files on the Japanese bureaucrat, hoping for some clue, some indication of just what mischief the man might have up his perfectly tailored sleeve. The files told him nothing he didn't already know. Which left him right back where he usually was, depending on his own hunches. He sighed and began to go over the highlights of Consort's main project, the construction of the Laser Launch System.

The computer droned on about the main components of the massive project—the huge Ground Based Laser installation, to be located in a barren Nevada area about a hundred miles from Hoover Dam, powered by a direct five

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hundred megawatt feed from the dam-site. The laser itself would then focus on the second part of the system—the Launcher itself. Here small, multi-ton ships would catch the beamed energy and focus it into tiny propulsion chambers where the immense heat would literally turn air into plasma, providing boost. The initial specs called for a hundred of these ships, each lifting about two tons of payload into orbit. The engineers estimated that with this system fully automated, on any given day twenty launches might be completed, giving a daily launch to orbit factor of forty tons. The antiquated U.S. Shuttle was capable of thirty-two tons at a launch, but what with delays and breakdowns, was lucky to accomplish this once every two months.

The implications were enormous.

With this kind of launch capability, costs dropped to less than two dollars a pound for payload in orbit. Anybody could afford to take advantage of the system. The great expansion could begin, and mankind take its rightful presence on the newest, and biggest frontier.

It meant that industry would go into orbit, would set up on the moon, in fact would *have* to build the first lunar city, and it meant that Consort and its stockholders would grow rich beyond any previous dream of avarice.

It was the future. For himself, for everyone else. And Mitsu Fujiwara was screwing things up.

His onboard computer advised him in a dulcet voice that they were leaving the automatic grid of the Golden Gate Bridge Authority, and would he mind taking control of the car again?

He tightened his hands on the wheel of the little CavDart as the autogrid cut out and the steering came alive again. Carefully, he followed the exit down and away from the Bridge level, keeping an eye on the swarms of traffic around him, until he came to the North Marin cutoff. Another couple of miles brought him to the huge concrete launchpad for his area. Automatically, his computer requested a launch ticket, and within two minutes he was following the white line of his takeoff lane. The double-delta wings of his small craft unfolded on either side as the pitch of its plastic engine whined a bit more loudly. A few seconds later he was airborne. Gratefully he released control to the Northern California Microwave Landing System and settled back, content to let the MLS pick his home from thousands of others and guide him there.

It was peaceful up here. High overhead a few clouds floated like gigantic heads of cauliflower. The late afternoon sun caught dancing flecks of light from other home-bound commuters, each carefully separate by the MLS. What, he wondered, had it been like forty years before? He'd still been in school, and the awful mass of ground-bound traffic in the Bay Area a distant concern.

He was glad he'd missed that bit of history. Already the cares of the day seemed to slip away, left behind in the receding towers of the City. He sighed and patted his stomach. Really have to exercise. Really.

He pushed that thought away and spoke to his computer.

"Mitsu Fujiwara, please."

The machine thought for a second, then replied, "His office is accepting calls, but he isn't available."

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"See if he can meet for lunch tomorrow. His choice, and I'll buy."

Another hesitation, then, "He's online."

"Mitsu?"

"Larry? Do I understand correctly? I get to pick the place, and you will pay?"

"Uh huh, Mitsu. That's right."

"Even Ma Tante Sumi?"

"Ouch. You know how to hurt a guy, don't you? Sure. You can even order the wine."

"How can I pass on something like that? Noon, Larry, and bring lots of money."

It was a joke. Nobody carried cash, but Schollander understood. "I will, Mitsu. I will."

The call ended, and the computer announced, "Three minutes to landing."

Lawrence Schollander watched the sun bend toward the horizon as the tiny ship coasted in toward his backyard pad, and wondered if it was all worth it.

Of course it was, he finally decided. Somebody had to do the dirty jobs.

Schollander arrived at the legendary Franco-Japanese restaurant in San Francisco's Castro district a few minutes early: his computer had informed him that he was on the alternate reservation list, and he understood what that meant; the maitre d' was politely requesting a bribe.

That small, smiling man was happily running Schollander's credit chip through his personal terminal, when Schollander felt a light touch on his shoulder. He turned. "Oh, Mitsu. I was worried you'd get hung up."

Mitsu Fujiwara bowed slightly, his smooth face creased with a wide, white grin. His black hair was in a fashionable shortcut, evidently done by a master, and his dark blue silk suit proclaimed quietly its Saville Row origins.

"Larry, you know my weakness. I flew three thousand miles to sample Ma Tante Sumi's latest creations and, of course, to speak with you. Nothing else could have brought me here, but you inscrutable Americans truly understand the art of bribery."

They shook hands. Fujiwara's grip was dry and hard. Schollander wondered what the Japanese bureaucrat did to produce that thick layer of callus on his palm. Not pushing paper, undoubtedly, and unconsciously, he sucked in his gut.

"It's always a pleasure to bribe you, Mitsu. You accept so graciously."

The maitre d' bustled up and led them to an excellent table in the rear of the small restaurant, still smiling over the size of his gratuity.

Fujiwara accepted his menu and glanced around. "You have a wonderful city here, Larry. Be grateful you don't have to toil in Washington's dismal swamps. They've forgotten how to cook there, you know."

"I don't think they ever knew," Schollander said sourly. "And speaking of bribery, Mitsu . . ."

The Japanese rolled his eyes. "I know, Larry. I know. You wish to bribe me, but please—let's eat first. Business goes better on a full stomach, don't you think?"

Schollander ordered a traditional house speciality, Sweetbreads en Miso, while Fujiwara summoned the chef and engaged him in a long conversation deal-

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ing with the freshness of the tuna. Finally he ordered, and added a bottle of twenty-year-old Cakebread sauvignon blanc, the staggering price of which served as clear warning of the level on which their discussion would be conducted.

As they ate, they discussed the chances of the San Mateo Turbos against the Washington Redskins in the upcoming Super Bowl.

"No way, Larry," Fujiwara said, wiping his lips with his napkin. "I'll lay you three to two for five thousand. The Turbos are hurting."

"Done," Schollander replied. "Now. Can we talk business?"

Fujiwara shrugged. "If you wish. Whatever you want. After all, you're buying."

"Aren't I always?"

Mitsu's black eyes snapped merrily. "Not always, Larry. Sometimes I, too, purchase things."

"Like congressmen?"

Again the small, expressive shrug. "You know how it is. Whatever is on the market."

"Mitsu, why are you doing this? I thought Consort and your people understood each other on this. We offered you fifteen percent participation before we even had the package put together."

Carefully, Fujiwara set down his napkin, picked up the last of his wine, and sipped. "Ah. Yes. Fifteen percent. Larry, how would you feel if that deal were reversed? If *we* initiated the project, and offered you that figure?"

"Oh. But we could have negotiated . . ."

"The parameters were set by the offer, Larry. Fifteen percent, twenty, perhaps even a full quarter. But no more. Am I correct?"

Schollander moved his butt on the leather seat, suddenly uncomfortable. "I think I see what—"

"We are as big as you, Larry. We could build our own system. Perhaps we will. Maybe we will offer Consort fifteen percent. What do you think?"

The atmosphere over the table was suddenly supercharged. Carefully, Schollander said, "Mitsu, it was not intended as an insult. But it does reflect reality. Japan has the money. But, as always, we have the technology. The *new* technology. It is a standoff there. Perhaps you could build a system. Perhaps. But it wouldn't be as good, and you know it."

The skin at the corner of Fujiwara's eyes crinkled very slightly. "Larry, what you say is true. It causes me great pain to admit that, you understand? And I would deny saying it if anybody quoted me. But I don't make the big decisions, nor do you. I only do what I'm told. Our government has problems, you realize. Japan will no longer accept being second class to anybody. Some of our people want to build the system themselves. They have their graphs, their figures, their tame engineers. I've seen them, and you're right—we *could* build it. And it wouldn't be as good."

He shrugged one final time. "But ideas don't get developed because they're best, do they? The world would be a better place if they did, but instead, things happen because people like you and me have lunch. And buy congressmen. And so on."

Schollander stared at him. "Are you trying to kill Consort?"

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Fujiwara's face was still as a slab of bone. "Fifty percent, Larry. We want half, or we build our own. And the world isn't big enough for two systems. Not right now."

"That's impossible, and you know it. All that will happen is that nothing gets built."

"It's a big pie, Larry. Surely for once you Americans could share equally?"

Schollander shook his head. "You know we can't. Congress would never go for equal participation with you. It isn't politically feasible."

"Can you beat me in your own Congress, Larry?"

Schollander raised his finger for the check. "I don't know, Mitsu. I can try, if it's my only option. Is it?"

Fujiwara's black eyes looked sad. "I'm afraid so, Larry. If it were a better world—but it isn't, is it?"

Schollander shook his head silently and paid the check.

"What's the damage?" Schollander asked.

Robert Hilkind crossed one leg over the other knee and stared off into space. "The damage is very bad, and getting worse." He rubbed the side of his nose. "Some of our legislators were very iffy, anyway. We only sold Consort to them on the basis of pork—that is, some company or companies in their districts would be getting contracts. Now Fujiwara is hinting that other companies might lose contracts—Japanese contracts. Did I ever tell you how to make a politician dance?"

Schollander shook his head.

"Put him on a fence and plant both sides with poison ivy. Those suckers don't know which way to turn right now. But if MITI makes their local business supporters nervous, they'll figure it out real quick."

"Great. That's great. Do we have leverage with the locals?"

Hilkind rubbed his thumb and forefinger together. "Some. Probably not enough. But that's not the worst part. I got a look at the PR campaign the Japanese are planning."

"Bad, is it?"

"Oh, if you think candid shots of a starving black family in Detroit, superimposed on pictures of a Consort launch site, with the voice-over unctuously asking, *'What has the space program ever done for you?'* is bad, I guess you could say so."

Schollander rubbed his belly absently. "That's going to kill us, you know? I could probably blackjack enough of these chickenfeed industrialists to keep Mitsui at bay, but a campaign like that—how do you explain that our society has troubles, yes, but the best way to end them is Consort? It's true, but nobody listens. Nobody has *ever* listened. To get them to understand, you have to sell them intellectually, and you can't sell *anything* intellectually." He paused. "I wish I could figure out how to do what I do best."

"You mean bribe somebody?"

"You got it. Any ideas?"

Hilkind pursed his lips. "We've bought just about everybody that's for sale. I don't know—"

Schollander watched his assistant, but his mind suddenly floated elsewhere. He remembered Mitsu Fujiwara telling him what a big pie it was. He thought about Margaret Thatcher. And

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he recalled a mayoral election in Las Vegas back in 1987 that he'd once studied in poli sci.

"There's hardly anybody left to buy," Hilkind said slowly.

"Want to bet?" Schollander asked. He felt the sudden joy he only knew when one of his hunches exploded full-grown inside his skull, and he found himself doing what he really did better than anybody he knew—laying it all on the line on his own instinct.

"You really want to bet? I got a gamble for you. . . ."

Senator Whetfeldt squeezed Schollander's elbow gently. "You sit right down here, Larry," he said, gently easing Schollander into the chair on his right at his table in the Senate dining room. Schollander nodded, trying to ignore the curious stares from Whetfeldt's fellow legislators. He could imagine what was on their minds. All of them had been astute enough to get elected once—which mean they could count votes. Most of them knew Consort was in trouble. The fact that Whetfeldt was making a show of being seen with him signaled the sharks that Consort still had at least one powerful ally, and Schollander was grateful.

"Now, what have you got in mind to stem this hemorrhage we seem to be suffering?" Whetfeldt said after they had ordered.

"Is it a hemorrhage now?"

"Damn close, my friend. I can't staunch the bleeding much longer. I've called in about all the notes I care to on this, Larry, and I don't think it's going to be enough. I need help. Did you bring any?"

"Maybe . . ." Schollander said.

When he finished talking, Whetfeldt stared at him. "Jesus God, my friend, that's about the most bald-faced thing I ever heard of."

Schollander nodded slowly.

"B.J. go for it?"

"What the hell choice does he have?" Schollander replied. "I explained the facts of life to him, and he passed the word on to our mommas and daddies GEM and all the others have too much invested to back off now. Prestige, if nothing else. Besides, they've gotten their tails kicked too many times by Mitsu and the boys to be in a very benevolent mood. They have to try, even if they think it won't work. Which they probably do." Schollander smiled at the junior senator from Montana, who was wavering all over the place, but thought nobody knew about it. "In other words, B.J. went for it. I've got an ad budget you wouldn't believe."

"Well, then," Jake Whetfeldt said. "I do expect we can talk a little turkey."

B.J. Titus was, as usual, unchanged. Schollander decided he was probably a bastard even in his sleep. A cold bastard.

"You understand what we are risking here, I presume?" Titus said carefully.

"Yes." *And what I'm risking. My chance. My new beginning. My . . . everything.*

"Okay, lay it out for me again."

Schollander raised his left hand and began ticking off points.

"Our main problem is that we've always tried to influence the representatives of the people. Congressmen, Senators, the staff support and the Ex-

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ecutive. That's why we keep such an army of lobbyists on the Hill."

"And that system has done well by us in the past."

"Yes. However, it has always had a drawback. A smart opponent can exploit that system. And Mitsu Fujiwara is smart. Maybe too smart."

"Perhaps I'm stupid, Larry, but he seems to be kicking your ass pretty good. How is that too smart?"

Schollander kept his face impassive. If this whole thing blew up, Titus had a solid platinum parachute. He himself, on the other hand, might well end up on a bread line somewhere. Nothing in his own contract specified a gentle letdown.

"Because he's playing the game by our rules. We've always assumed it was easier to influence the smaller group—the legislators and the executive branch. We spend a lot of money on commercial advertising, but we don't really try to influence general perceptions of our agenda. We decided long ago that the public was generally anti big business, and left it at that. Besides, it was easier to buy a congressman than buy all his voters."

"As Fujiwara is demonstrating."

"Yes. But think about what we do. We help those people get elected, and reelected, but who does the voting? Not us."

"Because we can't reach those voters, Larry," Titus said patiently.

"We haven't tried."

"So what makes you think it will be any different this time? Larry, I have to be honest with you. I convinced the big boys to fund your ad budget because it covers my ass. This thing is your baby now, and if it bombs, you bomb with it. Personally, I don't think you've got a snowball's chance."

Schollander nodded. *I always knew this time would come. What the hell. If you're gonna roll the dice, might as well put everything on the line.* "B.J., if you don't mind a personal question, how much of a chunk of Luna, Inc., did you squirrel away for yourself? Just in case, I mean."

"What you are suggesting would be against the law, Larry."

"Uh huh. Ten percent? Fifteen?"

Titus turned and looked out his window. "Twenty. My bosses think even less of this idea than you do."

"Right. Big pie in the sky. You want to bet half?"

"Spell it out."

"Easy. We get the appropriation, I get ten percent of Luna, Inc."

Slowly, B.J. Titus smiled. Schollander thought he would rather not have seen that. "Nothing from nothing is nothing, Larry," Titus said gently. "You're on."

"Put it in writing," Schollander said. He didn't realize he'd been shaking until he finally let out his breath.

Elias Swift downloaded his mail from his house computer at ten o'clock on a Saturday morning as he sat down for his third cup of coffee that day. The big new tractor had developed a glitch in its programming, and he'd spent most of the morning trying to debug the damned thing. It was winter in Winchester, Indiana, but his two hundred acres still had to be turned before January, and the anti-frost factors laid down for early spring corn.

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Idly, he scanned the outpouring of brochures, lottery come-ons, and personal mail. Something new caught his eye. Under a stylized logo of the moon with a star seeming to rise from its surface were the words "Print Me Out!"

Curiously he punched in the necessary commands. His machine was old, and he didn't feel any need for voiceop commands, but his laserprinter still worked just fine. Within twenty seconds a richly colored dark green sheet of heavily engraved paper dropped into his printer bin.

He picked up the sheet and stared at it, wondering what it was. The curlicue script was so intricate he had a little trouble reading it, but finally deciphered the large heading. "One Share," it said.

One share of what?

Karen Sanders was baking bread. Outside her snug condo, West Barnstable, Massachusetts, down on the Cape, was locked in the icy grip of its third bad storm of the month. She lay back on the sofa, wondering if she should work on those insurance exceptions she'd promised for Monday, but decided they could wait until the next day. Her contract with Assured Life specified piecework payment on delivery, but her bank account was okay. Unless, of course, she still wanted to take that vacation to Florida. The thought made her mildly uncomfortable—she was keeping the bills current, though still not saving much—but the delicious odor of her baking soothed her.

"To hell with it, right, Sandy?" she said to the large calico cat sprawled comfortably on her feet. The cat ignored her. Vicious beast. She shrugged. "Channel Seven," she said. Obediently, her wallscreen shifted to the new station. It was time for her favorite show.

Thundertroop was kicking off its new quarter season with a two hour special. New locations, she'd heard.

The camera panned across a white, pockmarked surface. The movement made her feel slightly dizzy. Now the scene shifted to a group of shining bubbles, like drops of crystal on the arid ground.

The subtitle came up in beneath the scene as the music crescendoed.

"Kennedy Crater—Thunderhome!"

Kennedy Crater? The moon?

Andy Willard stepped out of the frigid Chicago night into the relative warmth of the post office substation. Outside, the streetlamps cracked and sizzled in the dark, casting weird shadows. He loosened the tattered scarf around his neck and walked up to the window. The clerk stared at him impassively from behind the bulletproof glass.

She shifted her cigar from one side of her mouth to the other and grunted, "Number?"

Andy didn't own a computer, never had, never expected to. He had to pick up his assistance money in scrip, because he didn't have a bank account, either. He'd heard that some people never even used cash, but that was only rumor. He couldn't imagine such a thing.

He shoved his ID card through the small slot. Wordlessly, the clerk returned it, along with a small bundle of scrip and a larger, flat piece of paper.

"What's this?"

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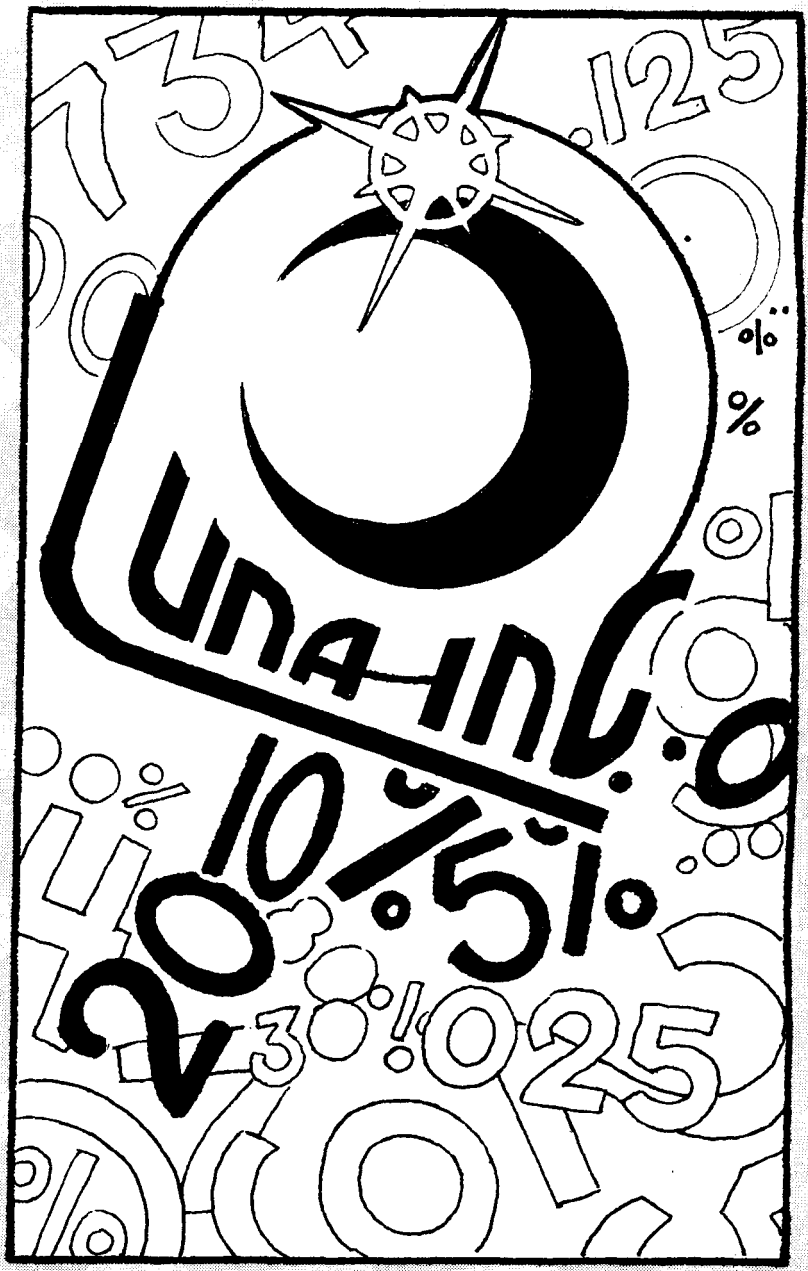

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"You voted in the last election, right?"

"Uh huh." And he had. He believed in democracy, even if it hadn't done a whole lot for him.

"That's yours, then. It's stock."

"What's a stock?"

"What's the score?" Schollander said.

"We're starting to make up the gap a little," Hilkind replied. His round face cracked a rare grin. "Not a bad idea for an old guy, Larry."

Schollander turned from his place by the window. Outside, the fog was humping in beneath the Golden Gate. Beyond, the sea was a white, shining cloud.

"Not really my idea, Bob," he said. "Margaret Thatcher did it back in the eighties. Took a lot of the nationalized companies private and sold stock to the lower and middle classes. It broke the back of the unions, because all of a sudden a lot of union members had a stake in the profitability of their own companies. And then there was this guy in Las Vegas."

"Vegas? What's that got to do—?"

"I studied the incident in college. He was running for mayor. It was a crazy election, and he was the outsider. He set up a company and *gave* stock to all registered voters. I guess the idea was that if he got elected, the stock would be worth something."

"What happened?"

"He lost."

"Oh."

"And so could we, Bobby," Schollander said. "Consort spins off a company to develop the moon. We call it Luna, Inc., and we issue a share of stock to every registered voter. And the value of that stock is zip. But the message is plain enough—someday the stock will be very valuable. But only if the moon gets developed, and that won't happen unless Consort gets built."

"It's bribery," Hilkind replied. "But good stuff. The best kind—bribery by promise. You can't even vote that stock, and only forty-nine percent was issued to the public. The other fifty-one, the voting stock, gets held by the big guys. You got any stock, Larry?"

Schollander turned back to the window. If this went through, he damn well did have stock, and someday that stock would make him very, very rich. But Hilkind didn't need to know that. "It all depends on whether we can translate this into pressure on Congress. Without that hundred-billion-dollar loan, we're still out of luck."

"I'm working on it. Believe it or not, moving Thunderhome to the moon may be the best thing we came up with. That's the most popular show in history. Already people are sending letters. Devers, from Indiana, was in Fujiwara's pocket yesterday. Now he's back in ours."

Schollander clasped his hands behind his back. "So how do we look?"

Hilkind's voice was slow. "Close. Too close to call."

"When is the vote?"

"Day after tomorrow."

Schollander sighed. "Do your best, Bobby." He closed his eyes. What had B.J. said? Nothing from nothing . . .

"Get me lunch with Mitsu," he told Hilkind. "Set it up for tomorrow."

* * *

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He had to fly into Washington and brave the chaos of New Dulles. Mitsu met him at Upstairs, the hot new D.C. power lunch spot.

"I'm sorry to make you come all this way, Larry, but I can't leave Washington right now. I'm sure you understand."

Schollander's stomach was giving him problems. He ordered a small Caesar salad and a bowl of soup. Fusiwara seemed unfazed by the pressure, and ordered his usual three course meal, along with a bottle of wine that represented enough money to support Andy Willard for a year.

They ate in silence. Schollander didn't feel up to a round of civilized chat. Finally, Mitsu ordered Keoki Coffee —"heavy, but it's winter. You need something warm in this miserable city."—and they settled back.

"I know why you came, Larry."

"Do you?"

"Yes, of course. I can count votes as well as you can. So what is the bribe?"

Schollander tasted his coffee, let the warm mixture of brandy and Kahlua slide down his throat. "I did some research on the Fujiwara family."

Mitsu's eyes flickered. "Really?"

"Uh huh. It's an Imperial house. It has supplied Emperors to the Japanese for centuries. The present Emperor, I believe, is even related to you, though not of your house."

"Third cousin," Mitsu said.

"Tell me, my friend. How do they raise you? We have nothing truly like that in our country. Oh, the Kennedys have established a tradition of public service, along with a couple of other families. But that's recent. You have a tradition a thousand years long. What is it like?"

Fujiwara's face was still. "We serve. We serve Japan. That's all." He paused. "That sounds simple, Larry. And it's not. That kind of service—no offense—is as foreign to the west as we are to you. It has nothing to do with money, you know. Nothing at all."

Schollander nodded. "If you stop Consort, we will stop whatever you do. You know that."

"I don't know any such thing."

"Yes, you do. And then nobody will build a launcher. Not for twenty, thirty years. Maybe not forever, given the shape we're in now. But Consort isn't the issue for me, Mitsu. The moon is the issue. Consort is only a way to get there."

"I'm listening."

"They talk about the orbiting factories, about the L5 colonies, all of that. But the moon is inescapable. Raw materials, research, industry, all of it. Only the moon gives us that. And without Consort, we can't have the moon."

"Is this a pitch for your Luna, Inc., scam, Larry?"

"Is it a scam, Mitsu? Have I said anything untrue?"

Fujiwara looked at the tablecloth, then up at Schollander. "We had this conversation before, perhaps. Truth is relative, and it doesn't get things done."

"If Japan doesn't go to the moon, is that relative?"

"Luna, Inc. is your company, Larry. Where do we fit in?"

"I want to go, Mitsu. But I want the moon to be something new. I want Luna, Inc. to be a beginning, not an-

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other of the same old battlefields. I wish to give you something, Mitsu. Five percent. Five percent of Luna stock."

Fujiwara's eyes grew cold. "Only five? That's not much, Larry."

"It's half of what I have. I have ten percent. As you once said, equal partners. It's a big pie, and we can share."

There was a moment of silence. Then Fujiwara shook his head. "No. I can't do it."

"This isn't a bribe, Mitsu. Call it a bet. A bet on the future."

"I'm sorry. . . ."

Schollander stood up. "I understand. But the offer stands, Fujiwara. No matter what, the offer stands. We either go together, or not at all."

The Japanese nodded. "Many things are like that, aren't they?"

Schollander and Hilkind sat in the Senate Gallery and watched roll call. Schollander felt exhausted. He'd spent the night cajoling, pressuring, and just plain begging. The Senate was the key. Things were so close that if the Senate bill passed, the House would fall in line.

And now things came to a head.

"What about Devers?"

"He's still with us. I think," Hilkind replied.

The vote ground on. The bill would pull ahead, then fall back. Schollander's stomach was making audible grinding noises. His head felt full of hot sand.

Hilkind groaned. "I was afraid of this."

"What?"

"It's going to come down to the final two votes—and as of yesterday, they belonged to Fujiwara."

"What if they split?"

"A tie."

"We win, then. Vice-president Abrams will break it in our favor."

Hilkind nodded. "But we need one of those votes." He shook his head. "And I don't think we're going to get it."

Schollander saw a familiar figure seated below them. "I'll be back," he said.

"Hello, Mitsu."

Fujiwara's smile was cheerful. "In a few minutes it will be over, Larry."

"Yes. It looks that way." Schollander felt lightheaded. "Mitsu, ten percent. All of it."

"What?"

"I will give you all my stock. Ten percent. Which, I might point out, translates into twenty percent of the voting stock."

For the first time in his life, Schollander saw an expression of shock creep across Mitsu Fujiwara's face. "Larry!" his voice was breathless. "You realize what you are offering?"

"Uh huh," Schollander said tiredly. "I'm trading my chance for everybody's chance. We have to do this, Mitsu. Consort is only a side issue. The moon is where the real drama will be played. Twenty percent is a big chunk. If you people end up controlling it, so be it. At least mankind will be there, where it ought to be. Where it *has* to be."

Fujiwara stared at him for what seemed an eternity. Finally he said, "Perhaps you do understand what it means to serve." He nodded once. "Excuse me, please."

Schollander watched him hurry up the

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steps. Then he closed his eyes. Soon enough, he could sleep.

Two old men and a young woman entered the small white room. The men were old, but in a strange way—their faces were unlined, but their movements betrayed them. Young old men, perhaps.

The woman was beautiful, with short, black hair and striking green eyes. Her voice was clear and deep.

"We'll do this quickly," she said. "We brought DataLine to Luna because of this, but people don't really understand what it means. You two men are stepping down at the same time—Mr. Fujiwara as chairman of the board, and you, Mr. Schollander, as president and CEO. Why have you chosen to do it this way?"

Schollander grinned. "We started together, I guess we should finish together."

"Luna, Inc. is the largest single corporation in the solar system. You must feel proud of your accomplishments."

Fujiwara nodded. "A great deal of work. Luna is a special place."

The woman whispered a note to her quickpak. "My producers suggested that we focus on the beginning. Luna's last quarterly dividend came to about six thousand dollars per share. An immense amount of money, but the stockholders take it for granted. They do now, of course—at first, when you were building the Laser Launch System, and then the first version of Kennedy Crater, expenses were enormous—and dividends were small. How did you survive that?"

"Pie in the sky," Schollander said.

"What?"

"We sold people pie in the sky. It's a rather ancient concept, but well understood."

"Oh. I think I see. . . ." She paused. She touched the tiny induction mike at the base of her right ear. "My producer doesn't think that should be discussed, if it's all right with you. He'd rather talk about the immense effort spent in building the Consort System, and Kennedy Crater. I agree. After all, that was the hardest part, wasn't it?"

The two old men glanced at each other. Mitsu Fujiwara smiled, but Schollander couldn't control himself. He burst out laughing. The beautiful young woman stared at him in bemusement.

"Am I missing something?"

"No," Schollander said at last. "I don't think we'd say that. Technology is *never* the hardest part." ■

●The quick harvest of applied science is the usable process, the medicine, the machine. The shy fruit of pure science is Understanding.

Lincoln Barrett

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on gaming

Matthew J. Costello

I'm sure that many people regard one's skill at playing chess as a measure of intelligence. I know that, because I used to share that misconception.

A little moral tale, first, to illustrate the point.

Years ago, I played regular games of chess with a friend who always won. Not only did he always win, but he made snide cracks about how long I was deliberating over my moves.

("C'mon, Costello, you gonna take all day?")

And when victory fell to him, as it inevitably did, I was rewarded by his —honest!—snickering and chortling.

But just like the weakling in the Charles Atlas ads in the back of comic books—you know, where the beef cake boor kicks sand in said weakling's face—I went out and got some books.

First, *Bobby Fisher Teaches Chess*—an absolutely marvelous "program learning" text that teaches elementary chess strategy. Then, some Dover books of great chess moves, starting with the classic games of Capobianco. I also studied chess problems—of the "black mates in four moves" variety that compelled my brain to see more than three or four moves ahead.

After a number of months of study, I was ready. I played my friend, ignoring his "let's get going" jibes. And beat the pants off him. Once. Then twice. Then again.

The friendship ended and victory, needless to say, was bittersweet.

But no matter. I had a new love —chess! I subscribed to the magazine *Chess Life and Review*, devoured chess books and then—oh fateful day—I joined the Riverdale Chess Club.

There I had the pleasure of playing gum-popping ten year olds . . . who ate me alive. It turned out that these preadolescents had chess tutors and actually took weekly lessons in chess.

It was at that point—when a bubble popped in my face—I decided that it was pretty ridiculous to devote one's free time to studying a game. You could learn to play the violin, for Pete's sake, and bring some music into the world.

Chess ability, I decided, was mostly a matter of intense study, with intelligence being a determining factor only in the highest stratosphere of the competitive world. For mere mortals, the winner would simply be the person who had studied the game more.

Which brings us to variants.

Chess variants—variations on the basic game—have long been around, as a way of providing chess-based games that gave players a break from the 64 squares, with 16 pieces each. Usually I've not liked them—either preferring to play the real thing, or something else.

And so I felt decidedly cold towards *Sceptre 1027* A.D. (Horizon Games, Inc., P.O. Box 701, Plainfield, IN 46168). *Sceptre* was certainly the most ambitious variant I had ever seen. There

(continued on page 153)

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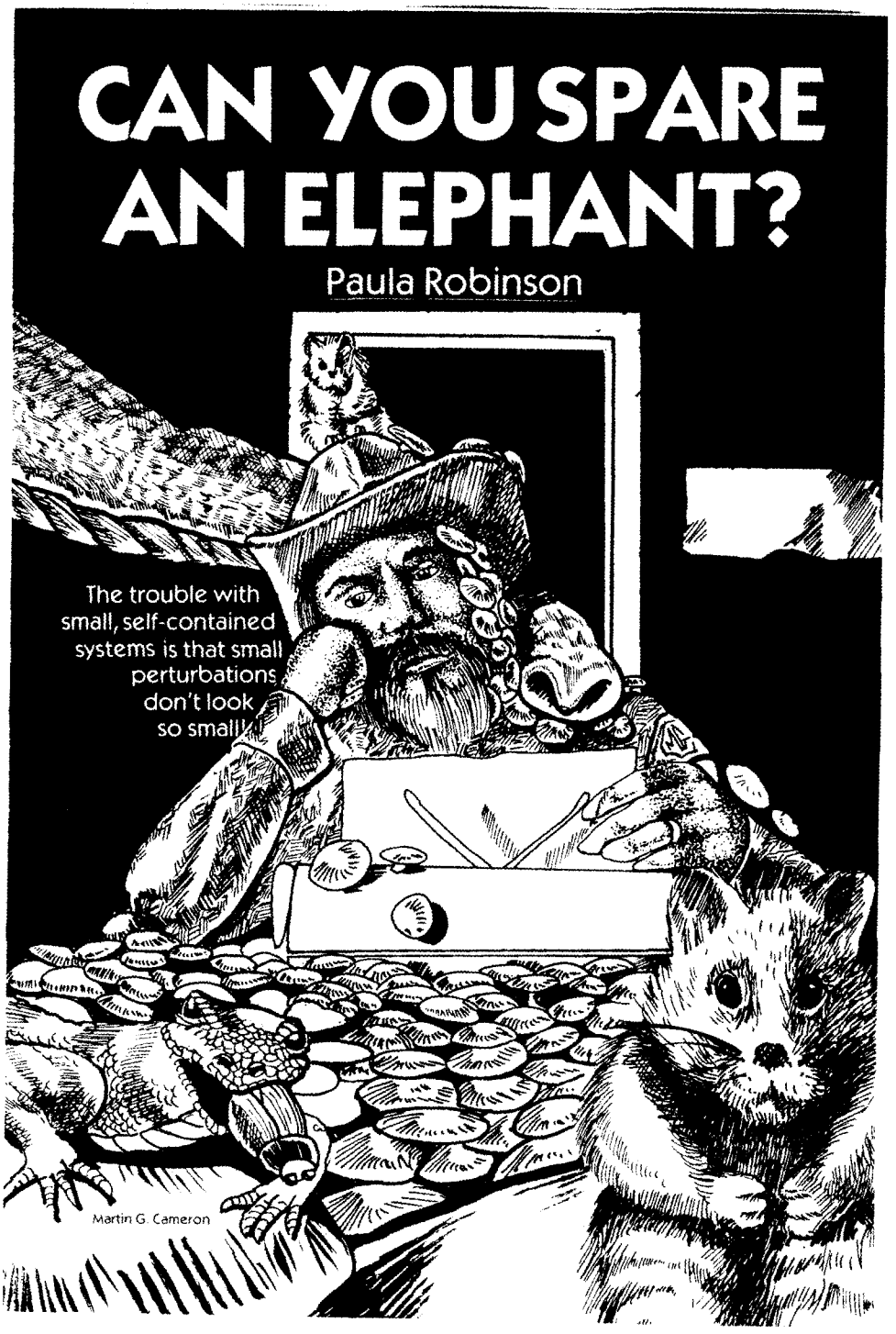
CAN YOU SPARE AN ELEPHANT?

Paula Robinson



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Harold Tilford brushed aside soiled cutlery and scraps of paper on the table so he could set down his coffee mug. He wondered if he'd ever have his cleaning program again. He glared disgustedly at the seven-point stag's head over the faux mantel. It stared blindly back at him, its speckled bluebird's egg eyes complementing the dessicated tongue lolling crazily to the side.

The door leading to the forest bio habitat quivered. Loud squawks and chirps hovered for a moment, then moved off to a far corner of the enclosure. The animals. Harold moaned and carried his coffee into the other room of the Martian cabin. He wouldn't have to listen to them out there.

Two rooms and a bio habitat, lots of solitude, neighbors three kilometers and one phone call away . . . Harold stared out the windows at the barren red terrain. This place had been great, before the problems in Syrtis Major Quad.

Kicking aside two Martian week-old newspapers he'd gotten in the mail yesterday, Harold placed the coffee next to the overstuffed chair. One stupid, misfired atomic driveship, a flash of pulse, and now most of Mars was knocked out. He'd been okay through it all because he stayed in the bio habitat until the emergency techs got his cabin livable again. How long ago had that been? Pretty damn long, he decided. Back then, the bio habitat was *normal*.

Since then, Earth-based pressure groups had decided that Syrtis Major would get *all* the scientific attention available on both planets. On Earth, that meant sending shuttles full of care packages every other terran year. On Mars, it meant getting equipment or repairs for the simplest things—such as telephones—was deemed "nonessential." If that weren't enough, they'd managed to ban atomic drive! Which explained why the shuttles came every 1.88 Earth/one Martian year(s), depending on your planetary orientation. Non-atom ships were *slow*.

Well, he did have an order in for a new home computer with a bio program. He'd just have to be patient until it arrived. It had only been one terran year.

The noise from the bio habitat grew louder. Harold slammed down the coffee, grabbed the antique shotgun he kept as a wall decoration, loaded it, and strode toward the din.

It all started a few weeks after the disaster. He'd noticed that his pet hamster was missing; probably it had gotten outside and freeze-dried itself. He missed it. Besides, the bio habitat seemed to need a few minor adjustments. He would have contacted the major bio supply company in lower Memnonia, but the mail was too unpredictable at that range. Instead, he wrote to the nearest supply house a mere quarter-Quadrant away.

This resulted in 2.127 Martian years (four Earth years) of correspondence.

Dear Fellow Martians:

Enclosed you'll find a blank credit slip. My forest bio habitat, order number T–37–1447, is filling up with undecayed animals and plants. I need decomposition bacteria. Also, I'd appreciate one Siberian golden hamster, order D–29–2298, for use as a house pet.

Harold Tilford

Dear Mr. Stilford:

Thank you for your letter. We are sending a vial of decomp bacteria, T–37–0032, for your use, as well as one female Siberian golden hamster, D–29–2298. We have used your credit slip for this purchase.

Sincerely,
Mark Sangria, Manager

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* * *

Dear Mr. Sangria:

Two months ago I received your package containing one Siberian golden hamster and a vial of decomp bacteria. Unfortunately, I discovered an immediate overgrowth of mushrooms in my bio habitat following my use of the bacteria. They're taking over. Help!

Harold Tilford

P.S.: The name's *Tilford*, not Stilford.

Dear Mr. Stilford:

I double-checked the inventory and discovered the source of your problem. You received the wrong vial. It contained mushroom spores, not decomp bacteria. Unfortunately we're forced to do all the clerical work by hand these days, and the two types of vials are side by side on our shelves. We expect to have proper technical support after the Syrtis Major crisis is resolved.

Enclosed please find the correct vial of decomp bacteria. There will be no charge.

Apologetically yours,
Mark Sangria

Dear Mr. Sangria,

Pardon the mushroom stains on the paper, but I just dug my way out of the habitat and wasn't in the mood to wash my hands before writing.

I realize you don't have a computer to tell you how to balance a habitat, but I strongly urge that you folks get your act together. And send me something to get rid of the damn mushrooms, or I'll sue.

With all due respect,
Harold *TILFORD*

Dear Mr. TILFORD,

God, I'm sorry about the mushroom mix-up. I was trying to be professional, but in fact I'm the only person here—and I used to be the janitor. All the scientists got hauled out to Syrtis Major.

You'll receive a package of live beetles. This species was bred to feed on the type of mushrooms you've got—honest. I looked it up in a book.

Please let me know the results. I'm terribly sorry.

Mark

Dear Mark Sangria,

Hey, I can understand a mistake. The beetles you sent went to town on the mushrooms. Don't worry, I'll write again later.

Harold Tilford

Mark —

Worry. Send something that eats beetles, *quick!*

Harold

Harold,

I'm shipping you some lizards. They eat beetles. Are the mushrooms doing okay?

Mark

Mark,

The goddamn mushrooms are FINE. There are still a million of them, and the lizards are getting fat off the million beetles eating the million mushrooms.

Oh, you remember the hamster I ordered? I need seeds to feed it. It won't eat beetles or lizards, and the mushroom-eating bugs also eat the plant seeds I used to feed the hamster.

Arrrrr!

Harold

Harold,

I've been reading a lot lately. My research tells me that the mushrooms should take care of themselves after they've finished breaking down the or-

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ganic matter. Also, by now the lizards should have eaten enough beetles to solve your problem. I'm sending assorted seeds—Fas-Gro® brand—to help you get the plants back in balance.

You can use the hamster pellets included with the shipment until the seeds take root, which won't be long. I'm sorry the mail is so slow.

Word of mouth has it that a ship is due in one of our years. Then they'll be able to get the phones working, since Syrtis Major should be fully repaired and we'll have a new load of wires. You know politics! We can't use our own stuff to fix our machines—*they* have to send it. Then when our infrastructure is back together, we can ship whatever we can refine back to them—*through Syrtis Major!*

Anyway, you'll also find a vial of fungicide in the packet. You can use it if you can't wait for the mushrooms to slow down. If you do apply it, then use the second vial—decomp bacteria—to break them down.

Mark

Mark,

Thanks for the package. I'm afraid I'll have to ask for another hamster. I don't know how they get out of the cage. Guess I'll have to order a new one of those, too.

The fungicide killed the mushrooms all right, but now the birds from the original bio fauna have taken over. They're starting to eat the lizards, which were starving because the birds already finished off the beetles, which were dying anyway because I killed the mushrooms.

Do you have birth control for birds?

Harold

Harold,

Enclosed please find one hamster and one secure cage.

I read somewhere that you can *really* muck things up in a bio habitat by using birth control unless you really know what you're doing. You're better off just knocking down the nests until their population levels off.

Mark

Mark!!

Two of the hamsters must not have wandered outside! And the pregnant one must have gotten into the habitat! There are baby hamsters all over the place, and they're doing great because all the bird poop fertilized the seed plants, which are now so thick I can hardly open the habitat door.

I need something that eats a *lot* of plants. Can you spare an elephant?

Harold

Harold—

We don't keep exotic animals here in the Amazonis Quadrangle. They're located a quarter of the planet away, in Coprates, at Echus Chasma. No elephants. No way.

We *do* have a couple of deer in one of our own habitats, though. I'll twist the rules and send you one—on loan. It's on the way. Also, for the hamster influx, I'm sending five cats under separate cover.

If anybody asks, don't tell them where you're getting all this stuff. I found out from one of my friends that it's illegal for nonscientists to dispense live products. We could both end up in cryo hold for what we're doing.

Mark

Mark,

Gee, thanks for telling me about that *now*.

The deer arrived in perfect condi-

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tion—perfectly preserved, that is: freeze-dried. The delivery boy had to drive it out overnight. He couldn't have been twenty years old! He had a flat out in one of the channel beds and thought he had to unload the truck to change it, believe it or not. The bio crate leaked. Obviously.

The birds are finishing off the lizards and the hamsters are having a ball eating plant seeds. I think all I need now is something to control their reproduction now that the cats have knocked their numbers down.

By the way, I'm returning the cats. I think two of them are pregnant.

Harold

Harold—

I had to emergency telegraph one of the scientists to find out what to do about the deer. I told her it was a freak accident. She said she'd be back within the month to fix things, since the cleanup in Syrtis Major is finished.

The next shuttle is due about two days before you'll receive this note. Maybe they'll have the phones working. Life may even get back to *normal!*

I didn't have the nerve to tell her about your habitat problems. I'm saving that for after she gets back.

I'm sending two red-tailed hawks to help you hold down the hamsters.

Mark

Harold was approaching the habitat door when the phone rang.

Startled, he shoved aside some unwashed laundry covering it and picked it up.

"Hello?" a woman's voice said tentatively.

"Oh, yes. Hello." Harold was unused to telephone etiquette. This was the first time the instrument had rung in a little over two Martian/four Earth years.

"This is Doctor Silva," the voice said affably. "Mark Sangria tells me you've had some problems in your bio habitat."

Harold launched into a technicolor tirade detailing each step of the problem. "Right now," he finally growled, "the hawks are chasing the crows and hamsters all over the place, and they're all squeaking and squawking and ramming the walls."

There was a moment of silence. "Okay, Mr. Stilford," she said, and Harold winced. "I have a solution for you."

"You do?"

"Yes. I plugged the information you gave me into the bio program."

"You have a computer?" he said, incredulous.

"Naturally. Now that the cleanup is over, we have the equipment. You'll have yours, once the deliveries are normalized. Anyway," she went on as Harold moaned, "all you need to do—"

"What? What?" Harold gripped the shotgun.

"All you need to do is leave the habitat alone for a month or two. It'll balance itself out."

Harold giggled, somewhat hysterically.

"After that, just add the vial of decomp bacteria I'm forwarding—at no cost—and everything will—"

Harold shot the phone. Then he wrote to the major supply house in Syrtis Major and told them to send one bull elephant to Mark Sangria in Amazonis Quardrangle —C.O.D. ■

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The Alternate View

MARS: CRISIS IN EXPLORATION

G. Harry Stine

I don't normally devote this column to a book review. But I've just finished a book that deserves more than a short paragraph in Tom Easton's department. It's not only one of the best books about the planet Mars that I've ever read, but it forecasts a forthcoming crisis in exploration that may strongly affect all of us.

The book is *The Monuments of Mars, A City on the Edge of Forever*, by Richard C. Hoagland, published by North Atlantic Books, 2320 Blake Street, Berkely CA 94704, ISBN 0-938190-78-4. It costs $14.95 in trade paperback and is 348 pages long with 32 pages of photographs.

Some of you may recall an article by Hoagland in the November 1986 issue concerning the study and analysis of a strangely-shaped mesa photographed in the Cydonia region of Mars by the Viking Orbiters in 1976. Just because you read the article doesn't mean you shouldn't read this book. The book goes into a great deal more detail and contains information which wasn't available when Hoagland wrote the article.

Furthermore, it you like science books, you'll love this one because it's a book about *good* science carried out by the author and his colleagues doing what NASA and the planetary astronomers should have been doing since 1976; careful analyses of photographs from the Viking Orbiters. We taxpayers forked out a billion dollars to get some 70,000 photographs of the surface of Mars during the two Viking missions; very few of these images have been studied.

Now comes this group of scientists, engineers, technologists, and generalists—their qualifications and the way they approached this work cannot possibly cause anyone to claim they're "weird, crazy, far-out, von Däniken nuts." They aren't professional planetary astronomers, and this is perhaps one of their biggest problems vis-à-vis the planetary astronomers' community. But, as interested amateurs, they proceeded out of scientific curiosity to apply 1986 computer technology and image enhancement techniques to the 1976 data.

What they did, as detailed in Hoagland's book, is in the highest tradition of scientific inquiry.

However, the scientific community —the planetary astronomers in particular—has either failed or refused to give them a hearing. This would have been unheard of in the planetary science community thirty-five years ago when professionals such as Dr. Clyde W. Tombaugh eagerly looked at and exchanged data with amateurs such as Walter Haas and others. In the thirty-five years since then, it appears a new class of scientific Brahmins has developed with intellectual turf they feel they must defend because they've built their careers on grants and contracts resting on this turf.

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The reason I gave the address of the publisher is simple: You probably won't find this book in most of the Big Chain Shopping Mall Bookstores (you know the ones I mean) and you'll have to order it directly from the publisher. It's *not* a cult book, and it doesn't come from the same roots as the von Däniken and UFO material. I've known Hoagland for twenty years and, although he doesn't have that union card called a bachelor's degree which confirms he's a card-carrying scientist, a degree would be four years of wasted time for Dick, who's learned (a) mental discipline, (b) how to learn, and (c) how to find information, which are the only three things one really learns as an undergraduate—except maybe how to open a beer bottle with a quarter.

But people ranging from planetary scientists (who should know better) and booksellers (who shouldn't pre-select what their customers can buy) have exhibited two reactions to the Mars data, not only in response to Hoagland's earlier article but to the book itself: (1) excited desire to see and evaluate the new data, or (2) total, complete, and often violent rejection of the data, including an outright refusal to look at it or, after having seen it, denial that it has been seen at all.

Something unusual is going on here. And in Washington. And in Moscow.

The U.S.A. spent fifteen years from 1961 to 1976 searching for extraterrestrial life with SETI and the Viking missions to Mars. We wanted almost desperately to learn we weren't alone in the universe, that "E.T." and others might *really* be out there.

But SETI has turned up nothing.

And the Viking Landers produced debatable data concerning the existence of organic life at two locations on the present Martian surface.

Did anyone happen to notice that the starch sort of went out of the public's love affair with the planetary exploration portion of our space program in about 1976 when Viking seemed to tell us we were indeed alone in the solar system?

Or was that what Viking *really* told us? Were there data it sent back that we overlooked or misinterpreted? After all, as many people said in 1976, this was the first time we humans ever went looking for life elsewhere, and would we really recognize it if we found it?

The Viking Orbiter photos—most of them ignored and even hidden from public view for over a decade—may have given us a piece of data to indicate that our search for extraterrestrial life hit paydirt right in our own backyard much sooner and in a much different manner that we could possibly have imagined.

Hoagland's book is an excellent analysis of the Viking Orbiter photos and a consideration of some of the consequences. On the basis of the evidence, the "monuments on Mars" are either (a) natural formations, or (b) artificial structures built by someone.

There is no in-between position.

If they're natural, it might be interesting to know how they were formed in such precise alignment with one another and with the summer solstice in Cydonia 500,000 years ago.

If they are not natural, a whole series of other questions arises: Who built them? When were they built? Why were

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they built? Are the builders still there? If they are, why haven't they made themselves known to us? If not, where did they go? And why? And what did they have to do with us here on Earth? And why?

Folks, this should be something that science fiction as a genre of speculative literature should look into. But I've seen several well-known SF authors run screaming from the data, refusing to look at it.

So what do we do? Whether or not we've stumbled upon the ruins of an ancient civilization on Mars, we've certainly discovered something anomalous. Anomalies bother me. The universe contains no real anomalies and no paradoxes.

It seems to me we can't stop here with what we've got. Good science and open minds demand that we return to Mars for another look with photographic sensors of higher resolution. They will either confirm or refute the possibility that we've indeed stumbled onto what appears to be the remains of an extraterrestrial civilization.

We can talk about it, or we can get the answer by going back for another look.

Going back for another look leads directly to a crisis in exploration.

The Soviets are going back to Mars to look again; they've told us so. (Thirty years ago, they told us three years in advance that they were going to launch Sputnik and even gave us the radio frequencies; we didn't believe them then.) They know about the "monuments" on Mars; the August 1984 issue of *Soviet Life* magazine carried an article, "Pyramids on Mars?" by Vladimir Avinsky, who, by independent study of the Viking Orbiter photos, came to the same conclusion as Hoagland and his team at about the same time. No, the Soviets didn't steal it. The Independent Mars Project team tried to present its first paper in Boulder less than a month ahead of the *Soviet Life* article; they were denied permission to present their paper and had to do it privately in a motel room during the conference. And any article that gets into *Soviet Life* (published by the First Chief Directorate of the KGB) must be approved up and down and through so many Moscow bureaucracies that it takes months and even years to get the CPSU Seal of Approval and be published.

The U.S.A. is also going back with the unmanned Mars Observer which has been strangely postponed from 1990 to 1992. The spacecraft has recently had a camera bolted to the framework, an afterthought that's one of the biggest kludges in NASA history. NASA doesn't do "kludgy" work; they gold plate it. That's what makes the sudden appearance of a very high resolution camera on Mars Observer such an anomaly. It has no scan platform; the entire spacecraft will have to be slewed to get photographs with that bolt-on camera.

A space race to Mars? We may have no choice. The Soviets are going unmanned to the Martian moon Phobos in 1988 to check it out. If they find it's a carbonaceous chondrite, it will contain water, carbon, nitrogen, and other volatiles. It can be an almost self-sustaining base. If the Soviets have a base on Phobos that's *the* filling station for round-trip Mars missions, will they share a small twenty-mile satellite with all its

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natural resources? The UN Treaty of Principles says they must and that they cannot claim it. But that Treaty will be just a piece of paper more than fifty million miles away. . . .

In another strange move, the U.S.A. and the USSR have concluded an agreement to share Mars data. Secretary of State Schultz and Foreign Minister Shevardnadze signed it in Moscow in April 1987. One can hope that *glasnost* extends to Mars. Although the Soviets publish their data on manned spaceflight (in Russian, the international language of space), I'm not too sure I want to bet the farm that we'd get all the data on an alien technology found on Mars from a culture where political control rests on the absolute control of information.

And I'm not sure we're going to be very happy if the Soviets take the opportunity on the 500th Anniversary of the Columbus voyage and the 75th Anniversary of the October Revolution to announce to the world that they've discovered and confirmed the existence of a former race of extraterrestrial beings who once built mighty socialist-like arcologies on Mars.

A lot of very important and dramatic things are likely to occur in space during the next five years. The Mars findings may be part of this. They have the potential of drastically affecting our lives and the way we think about ourselves and the universe. If you want to be prepared, I highly recommend reading Hoagland's book.

And *any* science fiction author with a shred of imagination will see dozens of fascinating story ideas in this book. If science fiction is indeed the literature that investigates the consequences of future scenarios, this book is a treasure trove.

It's also the most mind-stretching book I've read in a long time. ■

●Science is the attempt to make the chaotic diversity of our sense-experience correspond to a logically uniform system of thought.

Albert Einstein

●As soon as anyone belongs to a narrow creed in science, every unprejudiced and true perception is gone.

Wolfgang Von Goethe

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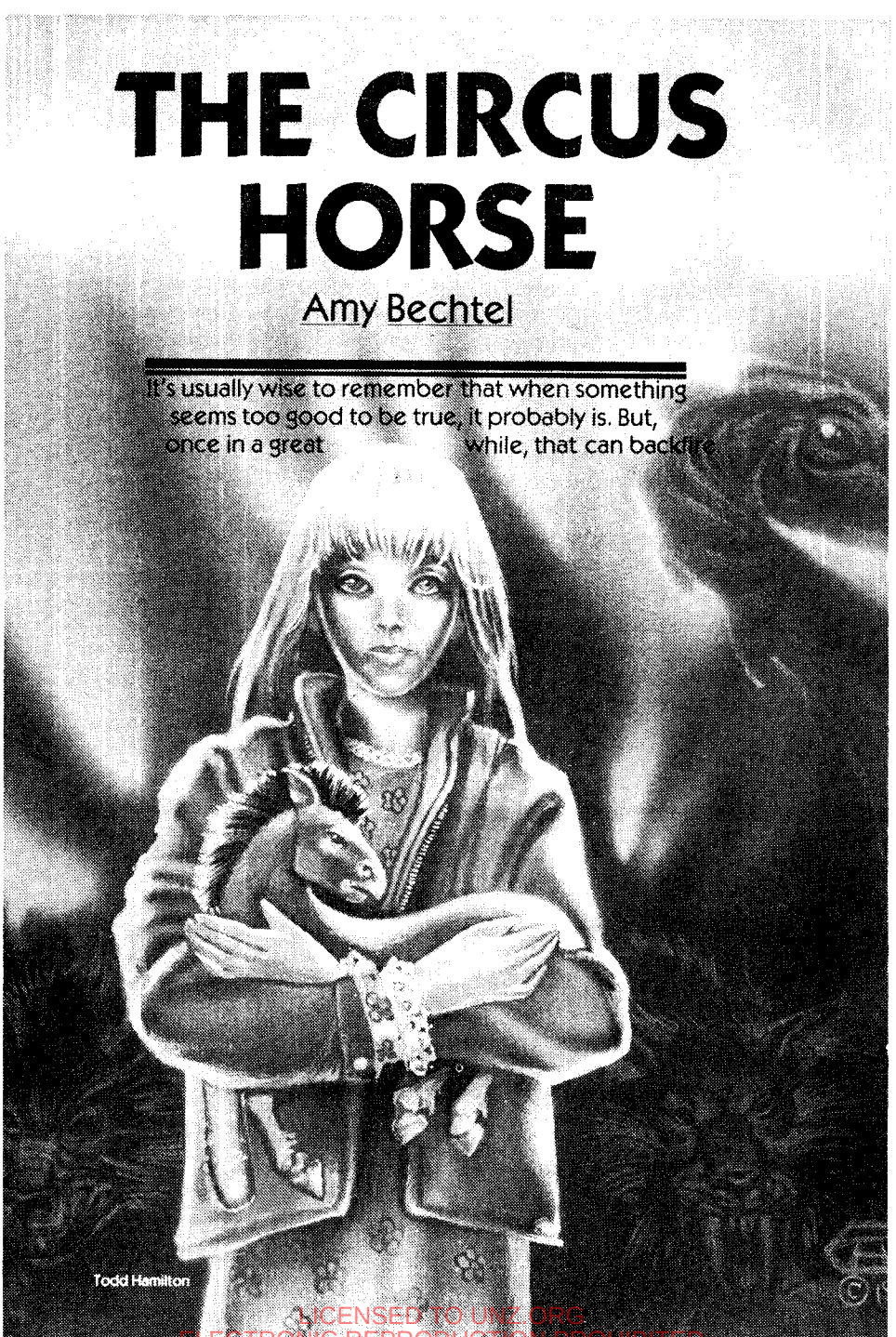
THE CIRCUS HORSE

Amy Bechtel

It's usually wise to remember that when something seems too good to be true, it probably is. But, once in a great while, that can backfire.



Todd Hamilton

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Russell Clark saw a flash of headlights as a pickup and stock trailer pulled into his drive, and he sighed, put down his coffee, and went outside. It was eleven-thirty at night. He'd just crawled into bed and turned out the light when old Fred Brown had called, worried about a cow that wasn't getting on with a calving as she should. Clark supposed he should be glad Fred had brought the cow to the clinic rather than asking for a farm call, but he wasn't; he only wanted to go back to bed.

The truck and trailer maneuvered, backing up to the chute; then the engine ground to a stop and Clark heard a god-awful racket of reverberating crashes and bangs coming from the trailer. Fred Brown jumped out of the pickup and peered at his cow as if he'd never seen her before; Clark moved closer and saw the frantic black beast lurching back and forth, slamming her body against the trailer slats as hard as she could. Clark sighed again; he was tired—*so* tired—of unmanageable animals turning up at his clinic in the middle of the night.

"What in the world have you got here, Fred?" he asked.

"I dunno, doc," Fred Brown said. "Can't figure out what's the matter with her. She's my wife's pet, you know? She was calm as could be when I loaded her up."

Clark winced as the cow smashed her head solidly against the trailer door. "You ever trailered her before?" he asked. "Maybe the trip got her all excited."

Fred Brown shook his head, looking puzzled. "I've trailered her plenty of times, and she's never acted like this before."

"Let's wait a couple of minutes, then," Clark said. "See if she'll settle. How long have you seen her straining?"

"All day, doc, and she hasn't got nowhere with it."

The cow suddenly stopped plunging and stood with her face pressed against the trailer slats, sides heaving. She let out a long low bellow, which was answered by a shrill whinny and a crashing noise from within the barn. Fred Brown smiled wanly.

"Guess she's got your patients riled up too, huh, doc?"

"Guess so." Clark frowned and went to the barn to check on the animals within. Fred Brown trotted beside him, talking all the while. "Hope we get a good calf out of her. My wife, she's been looking forward to it. She's been going out to check on this old cow every night, you know?"

Clark nodded absently, listening to the restless shuffle of hooves circling in sandy stalls. He fumbled for the light switch and turned it on. The pony in the nearest stall plunged away from him, eyes rolling, and the goats bleated nervously as they milled about, butting at each other. An old mare pawed the ground, filling the air with dust. A peacock fluttered down from the loft and let loose a bloodcurdling wail.

Clark winced. "Sometimes I hate that damned peacock," he muttered. "I could wring its noisy little neck."

"Know what you mean—my neighbors have one, and my wife keeps thinkin' she hears a baby screaming. Is it little Anny's pet?"

"Yeah. Half the things in here are Anny's pets. They eat me out of house and home, but if I got rid of 'em she'd

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never understand.'' Whenever his granddaughter found out that an animal was scheduled to be euthanized, he could rarely bring himself to go through with it; if he did, he had to face Anny's misery for weeks. Anny sometimes understood that animals with incurable illnesses ought to be put to sleep to spare their suffering, but it was useless trying to explain economic situations to her, or worse, owners who simply lost interest in their pets. Clark had gotten stuck with a lot of unwanted animals. The worst one was the big gray hydrocephalic cat which was now Anny's constant companion. Clark had first seen it as a kitten with a bulging head and yellow buglike eyes—severely retarded, dangerously uncoordinated. The owner had wanted to put it to sleep. Clark had actually had a needle in its vein, his thumb pressed against the plunger of a syringe of deathly-green T-61, when he had felt Anny's sad, accusing gaze. Anny had not actually been there, but he'd felt her presence—he'd almost seen her: his twelve-year-old granddaughter who acted more like a six year old, her wispy blond hair not quite hiding the soft bulge at the back of her head. Shaken, he had given Anny the kitten, though it still made him ill to see the two of them together.

''How is little Anny?'' Fred Brown asked, his tone carefully neutral—the same dutiful question that everyone asked, every time. Clark was sick of people asking how little Anny was. As if she'd ever get any better. She'd had all the surgery and all the medical treatments that were available, but nothing could correct the damage that had already been done.

''She's fine,'' he said shortly. He put Anny out of his mind and turned his attention to the nervous animals in the stalls. ''I wonder what's got them all so jumpy,'' he muttered.

''Maybe a stray dog roamin' around? They could've picked up a smell they didn't care for.''

''Maybe so.'' Clark looked at his watch. It was going to be a long evening, and with his luck it would be a difficult delivery. ''Come on, let's get that cow in the swing-around,' he said. As he strode back to the trailer, a cacophony of barks and howls erupted from the kennel in his clinic, and he frowned.

Anny lay underneath the covers of her bed with her cat Ace, holding a dim flashlight on the pages of a picture book about circuses. She smiled at the pictures. She'd never been to a circus but her mother had told her that one had just come to town and that in a couple of days she'd get to see it. It looked like ever such fun. All the pretty animals, glittering with spangles, and the clowns, and the acrobats in their brilliant costumes . . . she couldn't wait! She moved the light to the lines of big print and concentrated hard, but as always the letters meant nothing to her. She banged the flashlight against her head in frustration, and the light dimmed further.

Ace lifted his head suddenly, yellow eyes gleaming, ears pricked forward on his oversized domed head. Anny had rarely seen him look so alert. ''Whatsa matter, Ace?'' she whispered.

Ace gave her a quick glance when she spoke, then stretched awkwardly and climbed out from under the blanket.

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He sat on the edge of the bed and stared out the half-open window, where white curtains trimmed with blue fluttered in a soft cool breeze. Anny stroked him, smoothing his thick gray fur over his tensed muscles, scratching his big head.

Ace yowled. It was a low, disturbing sound that she had never heard from him before. His tail twitched.

"Ace?" Anny moved her hand away and stared at him.

The cat sprang from the bed to the windowsill, scrabbling ungracefully for balance, then disappeared out the window.

"Ace!"

Anny threw off the covers, dumping the book on the floor, and ran to the window. In the bright moonlight, she saw her cat trotting across the back pasture in the direction of the woods: he vanished abruptly into the murky blackness among the trees. Tears stung Anny's eyes. She couldn't lose Ace! She had to go after him, but she wasn't allowed to go outside after dark. She whimpered, trying to decide what to do.

From the other side of the house she heard the clattering of gates and the bellowing of a cow: Granpa must have an emergency. Slowly she realized that if he was busy, he'd never know if she slipped outside, and Momma wouldn't be home from work until morning. Anny found her shoes, dumped one of Ace's stuffed mice out of the right one, and put them on, then pulled a coat on over her nightgown. At the last second she remembered the flashlight. She snatched it up and wiggled out the window.

Her breath frosted in front of her as she jogged across the back pasture. Two cows and a horse saw her coming and bolted, startling her with the loud drum of their hooves. She paused, wondering why they'd run away. The cows were placid beasts, and the horse usually came up to be petted. Maybe they didn't realize it was her, since she'd never before been in their pasture at night. She shrugged, crawled through the spiky barbed-wire strands of the far fence, and entered the woods: dark and spooky, filled with rustling twigs and creaking branches. A flurry of leaves brushed against her legs.

"Ace?" Anny stopped and listened. Over the moan of the wind, she heard the soft patter and crunch of small paws running through dead leaves. "Ace!" She ran in the direction of the sound, dodging trees, stumps, and bushes, but she couldn't see the cat. She got out her flashlight and turned it on, but its light was no brighter than that of the full moon. She stopped and listened again. Nothing. She couldn't hear the paw-patter any more. She stuffed the useless flashlight in her pocket and turned slowly around.

The underbrush rustled. Anny turned in the direction of the sound, then froze in place when she realized that the sounds were much too loud to be Ace. Something big was crashing through the trees, coming closer and closer. Frightened, she ran away from the noise, but it followed her, louder every second. She tripped over a dead branch and fell sprawling. A huge dark shape, unrecognizable, flashed past in the nearby trees. Then it was gone, and the noise of its passage slowly receded. Anny gasped for breath. She got up and brushed herself off, trembling all over.

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What had that thing been? And would it come back?

She started to cry. Now she was too scared to go on looking for Ace, and she'd have to go home, and she might never see Ace again—what if he wandered to the highway and got run over? She covered her face with her hands, shaking and crying, until— suddenly —she realized what the creature had been. She laughed through her tears. Of course. It had been the horse, or one of the cows. Granpa was always complaining about that horse, threatening to sell it, because it was clever enough to open gates with its nose, and was always getting loose along with its pasture-mates. It wasn't anything to be afraid of. She *could go on looking for Ace.*

But she still felt uneasy. Maybe she'd better make sure. She trotted back through the woods, back in the direction of the house. She crawled through the strands of the fence and peered around the pasture as the wind soughed through the long grass at her feet.

She saw the horse and both cows standing in the middle of the pasture. The horse was nervously pawing the ground.

Anny shivered, the huge black beast running through her mind. A piercing squawk echoed in her ears, and she heard wings flapping vigorously above her. Something dove low over her head, screeching and drumming its wings, then vanished into the blackness of the night.

"Doc, what's wrong with them animals now?" Fred Brown asked.

"Huh?" Clark had the calf-puller fixed on the cow's rear and was hauling out the calf, puffing hard as he cranked the ratchet. He was getting too old for this kind of thing, too old and too tired. He ought to retire properly sometime soon, or at least hire an assistant. He'd tried that once, but the new man's enthusiasm and fresh-learned knowledge had intimidated him. It had jarred him into realizing how out-of-date he was, how out of touch with new methods; made him feel guilty about the stacks of dusty journals that he never quite got around to reading. He hated feeling inadequate, and had solved the problem by getting rid of the assistant. He'd stubbornly kept working on his own. But he couldn't go on like this forever. Aloud, he said, "What'd you say, *Fred*?"

"All them animals are just settin' there. Staring. Not a one's making a sound."

"Fine by me," Clark muttered, not looking up. "Quieter the better. Grab her tail, willya, Fred? The calf's coming now."

Out in the pasture, the horse stopped its nervous pawing and stood motionless, staring intently in the direction of the woods. One cow stood on either side of it, just as still. Anny slowly walked up to them, touched them and poked them, but they ignored her. All of them were staring in the same direction, and the horse's ears were pricked sharply forward. Anny turned and looked. She saw a soft glow of yellow light coming from deep in the woods. Silhouetted against the light she saw a slow moving line of shadows: animals, walking quietly and sedately toward the source of the light. At the end of the line she saw a shadow that looked like an elephant.

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Anny's breath exploded in a huge sigh of relief. They were circus animals! Why hadn't anyone told her that the circus was going to set up so near? Anny scrambled through the fence, ripping the hem of her nightgown on a barb in her hurry. She couldn't wait to see the tent. If she was quick enough maybe she'd get to see the whole line of animals go in, and Ace was bound to be lurking somewhere nearby. She ran through the woods, the light shining brighter and brighter as she neared the clearing where the circus tent had been set up.

She stopped in the bushes at the edge of the clearing, breathless and suddenly shy. She didn't want to meet any of the circus people, didn't want to find out if they would whisper about her behind their backs, or laugh, or call her stupid, or *hey ree-tard!*—the way other people did. She only wanted to watch.

The circus tent was a shiny silver dome, ever so pretty, with gold and blue stripes around its sides, and large black letters which Anny couldn't read. Its flaps were open and inside it Anny could see only darkness. The light was coming from somewhere outside. Two girls, fancily dressed in bright-colored coveralls, were directing the line of animals into the tent. And the animals! Anny had never imagined such a variety; this must surely be the finest circus in all the world, to have such animals.

A long-fanged golden cat marched into the tent and disappeared. It was followed by a big wolf with a pouch like a kangaroo's, then a large pink lizard with maroon wings and a snaky neck. Then two scurrying rodents. A low-flying bird with talons at its wingtips and sharp teeth in its beak. A small antelope with huge mooselike horns that seemed far too heavy for its body. A miniature elephant with an oddly shaped trunk and great yellow tusks . . .

One by one the animals vanished into the tent.

Anny hugged herself in delight, unable to believe that she'd seen such an incredible parade. Would there be any more animals? She didn't see any, but the two girls were still standing by the tent flap as if they expected more creatures to show up. Such pretty girls they were, with their vivid outfits and the sparkly jewels in their hair! But they looked worried. Maybe they'd lost one of their animals.

That thought gave Anny a jolt. She'd almost forgotten Ace! She looked around quickly, but the cat was nowhere to be seen. She'd been so sure she'd find him here. And it was getting awfully late —Granpa would be finished with his emergency any time now, in fact might already *be* finished, looking in Anny's room and finding the bed empty. *Where* could Ace be? Those girls might have seen him, but try as she would, Anny couldn't bring herself to go to them and ask. She was too scared of people, especially of pretty people who emphasized how peculiar she looked. No, she wouldn't ask yet. She'd look for Ace for just a little bit longer first.

She wandered back through the woods, stopping at intervals to listen, but she heard nothing until she neared the pasture fence. Then she heard something rustling in the leaves, thrashing, struggling.

"Ace?"

The sounds stopped for an instant, then began again. Anny pushed her way

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through the undergrowth. The moon passed behind a cloud, then emerged, shining bright in the sky, reflecting off frightened rolling eyes. At first Anny thought it was Ace, but when she crept closer she saw that it was a tiny dark horse, scarcely any bigger than Ace, with its front leg caught in the bottom strand of the fence. "It's okay," Anny whispered. "Don't be scared, okay?" She reached out to touch the frightened little horse, feeling a plastic collar fastened around the taut muscles of its neck. It belonged to someone, then. Of course! The circus. It was a little circus horse.

Anny tried to pull its leg free from the fence, but was hindered by the little horse's fruitless struggling. "Stop kicking!" she gasped. "I wanta help you out." Tears smarted in her eyes as a barb scraped against her arm. The horse ought to know she was trying to help; it ought to hold still. But it kept on pawing and fighting her. "Stop it!" Anny said. She put her knee against the horse's neck to hold it down, then grasped its trapped foreleg with both hands and finally managed to work it free. It wasn't bleeding very much, but the leg was dangling at a peculiar angle. The horse struggled to push itself to its feet but fell, thrashing and snorting. Anny picked it up, stroked it, tried to soothe it. She felt it trembling in her arms.

"It's okay," she said softly. "I'll take you to my Granpa. He'll fix you. It'll be okay."

Clark watched Fred Brown's truck and trailer rattle off down the road, hauling a cow and a brand-new calf. He dumped the calving chains in the rinse bucket and took a last look around the barn: he was a bit puzzled by the quietness of the animals in the stalls, but was too tired to worry about it. He switched out the light, patted his pockets, and found the bottle of tetracycline; he'd better put it back in the clinic cabinet before he forgot about it.

He went in and put the bottle away; then, yawning, glanced about the room at the cats and dogs in their cages. The yawn stopped abruptly and he felt an involuntary shiver in his spine, for all the dogs and cats lay motionless in their cages, paws crossed, staring blankly into space. Clark watched them for almost a full minute, and none of them moved. Then, as if by mutual agreement, they suddenly stirred, whining, or pawing at the cages, or curling up to sleep, each behaving in its own ordinary way. Feeling numb, Clark reached out to quiet a crying puppy. He must have been dreaming on his feet. He really was going to have to get more sleep. . . .

The door squeaked open, then slammed, and Anny burst into the room. "Anny!" he said. "What are you doing out of bed?" Then he saw the little animal that she was holding, clutched tightly against her coat.

"Is hurt," she whispered.

"Where did you find that?" He peered closer—he'd never seen a miniature horse so small.

She pointed. "Outside."

"Anny, don't you know you're not supposed to go outside at night?"

She hung her head and nodded.

"Then why did you go out?"

"Ace went out." She looked at him pleadingly. "I had to find him."

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Clark sighed. "And you found this little beast instead."

Anny nodded and said, "Can't find Ace." She clutched the little horse tighter and a tear slipped down her cheek. Clark gently pulled the horse out of her arms and laid it on the examining table; it struggled, trying to get away.

"Anny," he said, "I'm sure Ace will come back. Cats wander sometimes, you know, and they usually do come back. Come here now. I need you to hold the little horse for a minute. Okay? Come on, now."

Anny sniffed, rubbed the tears off her face, and reached for the horse, petting it gently. It quieted under her hands. Clark examined it quickly, finding no significant injuries except for the broken forelimb, but he puzzled for a moment over the hooves, each of which had a pair of extraneous digits dangling behind it. He had a vague memory of learning about it in school— polydactylism, or something like that; a birth deformity. He'd occasionally seen cats with six or seven toes on each paw; this must be the same sort of thing.

"Circus horse," Anny said suddenly.

"What?"

"It ran away, Granpa. From the circus. All the animals, they ran away, but they all went back. Except this one."

Clark remembered his daughter talking about the circus, saying that she planned to take Anny to see it. They'd had an argument about it. He said, "Anny, do you mean you saw the circus? Where?"

She pointed west, in the direction of young Davidson's property. Clark frowned. Davidson had a big empty pasture near the main road, which he would rent to anyone who paid him enough money; it was not surprising that a small traveling circus might choose to set up there. It frightened him to think of Anny going that far in the dark, but she was so miserable about Ace that he hadn't the heart to scold her. That blasted cat! He hoped—guiltily—that it would never come back.

He looked back at the little horse: a miniature circus horse, and a freak miniature horse at that. He'd have to take it back tomorrow and collect as much money as he could, in cash. The very thought of dealing with a circus made him uneasy; he supposed there was nothing wrong with most of them, but the last one he had encountered had been a shoestring operation where he'd had to deal with multiple cases of animal abuse. He remembered the sick smell of the cages, the deformed animals in the freak show—the two-headed lamb that was already dead, the eyeless dog, the calf that staggered about on its knees, unable to get up—and worse, the humans of the freak show who had stood nearby, watching him.

But that had been many years ago. The little horse on the table was deformed, but it had not been abused; aside from its injury it was in good health. All Clark needed to worry about was ensuring that he got paid for his work.

He manipulated the bones experimentally; it seemed to be a simple fracture, easy enough to reduce and cast, but he'd better take some films to be sure. And he'd have to be careful with the anesthetic dose: the little horse couldn't weigh more than fifteen pounds. It wouldn't take much. Calculating dos-

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ages in his head, he pulled off the horse's plastic collar and shoved it aside, exposing the jugular vein. It was a tiny vein; it would be as hard to hit as a cat's. Clark wondered if he would ever get to bed.

Anny fell asleep in a corner, her head pillowed on a dog-blanket, while Granpa put on the cast. She didn't wake up until after the cast was finished. She sat up, rubbing her eyes, peering at the tiny horse which slumbered peacefully on the table, at Granpa sitting on a stool beside it, waiting for the cast to harden. Had she heard something? Sleepily she wandered out of the exam room and into the waiting room. She heard a faint meow at the door.

"*Ace!*" Anny dashed to the door, yanked it open. Ace walked casually into the room and she hugged him in delight, then sat back happily and watched his awkward attempts to wash his tail. It was so good to have him back! She picked him up and put him in her lap, and he purred noisily.

"Excuse me."

Anny looked up, startled by the strange voice, and saw the girl—one of the girls from the circus tent! Anny grabbed Ace and ran out of the room, shouting, "Granpa! Granpa!"

"Who did you say?" Clark said. Anny was so excited, she wasn't making much sense.

"The girl!" Anny said. "The circus girl."

"Ah," Clark said. "Thanks, Anny. I wonder if she brought any money with her?" He tapped the cast, nodded absently, and placed the sleeping horse safely in a cage; it wouldn't do for it to roll off the table and break another leg. Then, whistling to himself, he strolled into the waiting room.

A girl in vivid dark blue coveralls stood uneasily in the middle of the room, shifting from foot to foot. Her hair was long, straight and silky black, glittering with multifaceted jewels. She held a little metal box that looked like a cassette player, the sort that joggers carried.

"What can I do for you?" Clark said.

She hesitated, glancing over his shoulder at the doorway where Anny crouched half-hidden, then said, "I'm Huong O'Brien, and I—um, we've lost an animal. About like so, a little horse." She measured the size with her hands. "I've managed to trace its collar to here—do you have it?"

Clark nodded solemnly. "Yes, my granddaughter found it. It's been injured—a broken leg—but I've got it casted and it should be just fine, given a little time."

Clark saw Huong's lovely face fill with relief. "Thank goodness," she whispered. "First thing that's gone right all day."

She followed him into the exam room, and Clark saw that Anny, with Ace clutched in her arms, had backed into a corner behind a dog cage without taking her eyes off Huong. Clark took the little horse out of the cage and put it back on the table: it was starting to wake up. Huong stroked the horse and brushed her fingers against the cast, frowning a little.

"How'd you lose the little guy?" Clark asked.

"Oh, well, it's been one of those

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days. The machine malfunctioned and the whole collection got loose, and when we activated the collars they were *all* supposed to come back, not all but one." She sighed, smoothing the horse's fluffy mane. "Poor little beast. It must have been trying to come back—it just couldn't manage." She looked up at Clark. "Thank you so much for finding it, and all. If I can do anything for you—"

"There's a charge for the treatment, of course," Clark said smoothly.

"A charge?"

"Yes—it'll come to fifty dollars. Just tell your manager at the circus tomorrow, and as soon as he pays the bill you can come and get the horse."

"I'm not sure I—" Huong broke off and sat down on a stool. She tugged nervously at her long hair, muttering to herself—something about studying zoology, not sociology or history. "Look," she said finally. "I don't have any money, and I can't wait until tomorrow. Surely there's something I could do for you, something that would be the equivalent of the payment you need?"

Clark stared open-mouthed, wondering if she meant what he thought she meant. Surely not. But one never knew; circus performers were a very strange lot. He noticed that Anny had crept out of the corner and was watching Huong intently, apparently fascinated by her. Huong caught the girl's glance and stared back. "I don't think—" Clark started.

Huong suddenly jumped up, went to Anny, and knelt in front of her. Anny stood very still, hardly breathing, as Huong touched her forehead and smoothed her wispy blond hair. When Huong moved her hand away, Anny reached out in turn, timidly touching one of the crystal jewels in Huong's hair. Huong smiled, then turned to Clark.

"What's the matter with her?" Huong said.

"Hydrocephalus," Clark said. "Not that it's any of your business."

"Hydrocephalus? Brain cells . . . destroyed?" Huong shivered, looking at Anny with pity. "I can repair the damage," she said. "Would that be payment enough?"

"What the hell are you talking about?" Clark whispered.

"I can repair it. Regenerate the brain. Let me take her back—"

"Get out of here," Clark said tightly. God, what an idiot she must think he was, if she thought he'd fall for something like that! He was suddenly almost blind with fury; the only thing that kept his temper from exploding was Anny's presence.

"You don't understand."

"I do understand, and you're not laying a hand on my granddaughter." Clark caught Anny's arm, pulled her away from Huong. "You know she can't be healed. What would you do with her, put her in your freak show? With your freak horse? Get out, now, and leave her alone."

Huong stared at him, her eyes huge. "I'm sorry," she whispered. "I—I don't know the customs—" Distraught, she backed away from Clark, fumbling in her hair to undo a clasp, and pulled the string of shimmering jewels out of her hair. She held them out to Clark and said, "Please, I have to go, and I have

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to take the horse. Please take these in payment."

Clark started to shake his head, but then he saw the way Anny was staring at the jewels, her mouth open, her eyes shining. "All right," Clark muttered.

Huong slowly dropped the glittering pieces, and Anny leaned forward to catch them, both hands cupped beneath Huong's. Then Huong reached for the little horse on the table.

"Wait," Anny said softly. Clark stared in shock. Anny had put the jewels on the floor and had picked up Ace. She was holding the cat out to Huong.

Huong hesitated, looking at Clark as if for permission to take the cat. He swallowed hard, blinking, wondering if he was dreaming again. What had gotten into Anny? Clark was more than glad for a chance to get rid of the cat, but he'd never imagined that Anny would allow it to be taken from her.

"Anny, you really want her to take Ace?"

She nodded solemnly.

"Think about what you're doing! You can't change your mind."

Anny nodded again, and firmly pushed Ace into Huong's hands.

"Well, okay then," Clark said feebly. He felt badly rattled. He watched as Huong tucked the cat under one arm, the little horse under the other. She glanced from Anny to Clark, her head tilted quizzically as if she were about to say something—but she said nothing. With a last look at Anny, she gave her head a quick shake and hurried out the door.

In the morning Clark woke tired and irritable, with the memory of Huong O'Brien giving him the chills. He stumbled down the hall to Anny's room and opened the door. She was asleep, hugging her pillow, and a gray cat was snuggled in a blissful ball beside her. Clark blinked and poked the cat, which looked up at him and glared with malevolent intelligence. Clearly it was not Ace.

Gently he shook Anny awake. "Where'd you get this cat?"

She looked puzzled. "It's Ace."

"No it isn't. Look at it."

She pushed herself up on one elbow and stroked the cat's perfectly ordinary gray head. "He's all better, Granpa," she said, and rolled over and went back to sleep.

Clark stared at the cat, which stared back at him, *all better*, and he shivered. Every second he felt colder, with a dreadful fear building, and he got up and went to the clinic, almost running by the time he got there, and frantically he began to pull books off the shelves.

An hour later, when Anny woke and went to look for her Granpa, she found him sprawled at his desk in the clinic, crying. She had never seen him cry before. There was a sloppy pile of books on his desk. Anny moved closer to look at them. The top book was open to a picture of the little horse she had found last night, and the plastic collar the horse had worn was draped atop the open book. Anny picked up the collar and looked at it. There were letters on it; she struggled to read them, but she would never know what they meant.

Oligocene Field Trip: Cambridge University; March 14, 2076. Student: Huong O'Brien. Specimen: Miohippus. ■

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RECIPE FOR A LIVING PLANET

Bill Vaughan

Living Planet
(serves up to 10 billion)

Ingredients: A number of planetesimals in the habitable zone of a star: far enough out for water to condense, but close enough in to drive off most of the hydrogen. Combine to make one (1) planet. Reserve one medium-sized planetoid, setting it aside in a nearby orbit.

Let the planet differentiate for one half billion years. Eventually a thick crust will rise to the surface, and the planet will produce a dense atmosphere as chondrite material decomposes to carbon dioxide and methane.

Now, using the reserved planetoid, strike the planet a glancing blow. This will remove the excess crust and atmosphere, and if done properly will create a large distant moon.

Let the planet cool for a second time. As it cools, the new thin crust will harden; a new atmosphere will form; and oceans will collect in low-lying areas. An organic sludge will soon form in the oceans; do not be alarmed at its appearance.

Using the moon prepared above, continuously stir the atmosphere and oceans for two billion years, or until life forms. The atmosphere will now clarify as oxygen and nitrogen replace the carbon dioxide and methane.

Agitate the crust, forming and reforming continents, while occasionally seasoning with comets and small asteroids. Varying the environment in this way allows life to evolve complex and beautiful ecosystems.

Watch out for these hazards:

—Make sure your planet is big enough to differentiate properly (about one Earth mass is known to work well). If a crust does not rise, add more planetoids.

—When life has formed, your planet will regulate its own temperature; but until then, it must be carefully watched. You must not let the oceans boil or freeze. If the planet gets too hot, you may remove a little more atmosphere by striking with a small asteroid. If it becomes too cold, your planet is spoiled: start over in a different solar system.

—If your crust is too thick, it will be hard to stir the continents, and diverse life forms may not develop.

—Do not overseason: destroying too many life forms may interrupt self-regulation of your atmosphere and oceans. Try not to let more than about 90% of species become extinct at any one time.

Properly maintained, a planet prepared according to this recipe can sustain over ten billion intelligent beings indefinitely. ■

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ROADBREAKERS

Jack Wodhams

What do you do with a very large white elephant?

William R. Warren, Jr.

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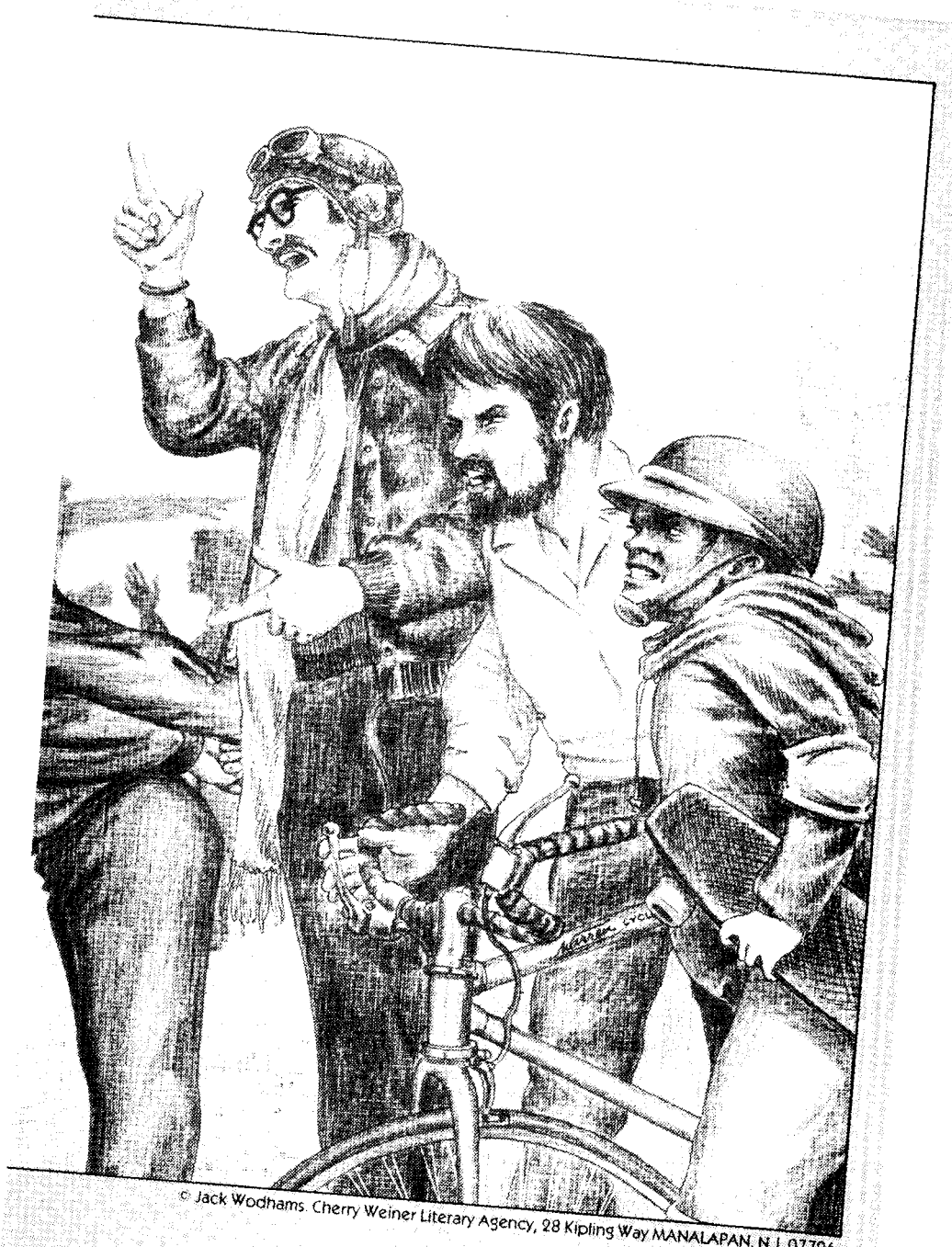

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Truth to tell our fortune had been made and the good old days were over but, I suppose, some of us never lose the taste for a challenge. We, Cap and me, had been winding down our outfit, selling off and amortizing assets that were becoming underutilized, but we still retained command of sufficient equipment to show a gainful interest in a worthwhile proposition.

"Bicycles, I ask you!" Tyson Corroloy was a treasury man. He was in his forties, had a promotion hanging on his performance, and was displaying early signs of frustration. "They're trying to con us that this is the longest continuous stretch of road left in the country. It isn't, is it? You *know* it isn't. We *all* know it isn't."

"Yes, Ty," I said with my usual well-practiced equability, "but it *is* the longest stretch of quality six-lane freeway that still exists. It was one of the last and one of the best tollways ever laid."

When, to fill the pause, I went on, I could not keep a certain admiration from my voice. "Very stable. Lateral compounding goes down to twenty meters at regular intervals. Makes it like an underground running arch bridge. Gives it a lot of superior resilience, and its sub-surface double-layered thermal and compression blankets provide an absorption balance that were just about tops in the state of the art at the time."

"Thanks," Tyson said. "Who's side are you on, girl?"

"I'm on nobody's side, Ty, you know that," I professed. "I'm just a servant. I just do what I'm told to do. Or am asked. I like to do what everybody thinks is right. My opinion isn't worth much, is it? Only counter-productive."

"Ah. But bicycles," Tyson repeated. "Over one hundred miles of road, and they want us to preserve it just to ride bicycles on. It's crazy. They got plenty of tracks. They got velodromes, haven't they? Over a hundred miles of road, to keep it just for them? It doesn't make sense."

"They've got a pretty influential lobby," I said.

"Fitness cranks," Tyson scowled. "Hardly anybody lives along that road at present. It has *no* local users. They'd have to come from all over the country just to ride their bicycles on it. It's absurd."

"They'd like to turn it into a national circuit."

"I can see *that*," Tyson growled. "Anybody can see that. But over a hundred miles. If they want a section they can bid for it, just like anybody else. A couple miles, five if they could afford it. But they want us to donate it—donate it! The whole damn lot. What are we, philanthropists?"

I gave him no answer, just my best noncomittal look.

"We should have done it before they resumed those last big stretches of Nationals Five and Eight. All of a sudden everybody seems to start to notice there's not too many good roads left any more. Suddenly people come out of the woodwork and start yelling about preserving something they haven't given much of a damn about up till now. It's hypocrisy."

I made no demur. This seemed adequate to encourage him to go on. "This is a state road. It cost us plenty to put

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down in the first place. Truth be known it never did pay itself off. We are entitled to recover what we can. We owe it to the taxpayers of this state."

Why he felt it necessary to try and convince *me* I did not know. Perhaps he was using me as a sounding board. That I studiously refused to raise any objection could have persuaded him that he was on the right track.

"Sonny, there's over sixteen hundred acres, nearly seven hundred hectares, tied up in that road. It's prime land. It cost *us* when we bought it. My predecessor didn't get it cheap. I'm not blaming him. It was sound speculation at the time. Nobody," he declared, but with a certain plaintiveness nevertheless, "could have foreseen that repplegee would make the tremendous impact that it has. The strides!" He shook his head. "Horseless carriage in, horseless carriage out. No, no one could have foreseen that."

"I'm surprised the Gas Buggy Salvers haven't joined in more strongly than they have."

"Yeah. No," Tyson said, "they got too bad a press when they demonstrated on the Hollinsworth to Chachucoa interstate bypass. Five crashes, I ask you, six people dying. What kind of publicity was that to draw? Reminded everybody of what road travel used to do to people."

Tyson brooded a moment. "Pity the G.B.S. hasn't come in, in a way. If we could get them on the K5A with a mob of cyclists, they could clean each other up and solve all our problems." He mused a moment. "I don't suppose it could be arranged, could it?" He sounded almost wistful.

"They have a natural hostility towards each other that seems to have been born with their respective disparate machines," I said. "Motorists and cyclists have a tradition of not seeing eye to eye."

"Hm." Tyson rubbed his chin. "We might still be able to use it somehow. The K5A Toll Road was *built* for motor vehicles, not bicycles. Bicycles don't need that kind of width, that kind of strength." The thought stimulated him slightly. "It is *not* a bicyle road. If the automobile associations are not going to come into the fight, I don't see these cyclists having any real case, do you?"

"Like you say, this is a state matter," I hedged. "You're attracting interest because you find yourself with the longest chunk of minimum maintenance highway that can be found in the country right now. Maybe you would have been better realizing its potential sooner."

I made him testy. "I know that, don't I? But when property values are constantly rising, what sort of state treasurer would I be if I'd sold up prematurely? Ha! You don't have to cop the flack. Nobody gave much of a damn. Who could have anticipated that so many twinkies would suddenly get the idea to become conservationist freaks?

"No, Sonny, the old K5A has got to go before it becomes a millstone round our necks, before we get stuck with it as some kind of national monument. They've still got eighty-five miles of the Touring Grand Coastal next door. Let *them* have the longest remaining length of top-class freeway in the country. And there's still quite a few others with fifty or sixty miles or so. If they want to bicycle there's still the mountains. A lot

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of the mountain territories have got hundreds and hundreds of miles left."

"Yes, but a lot of it is in dubious condition," I noted.

"If they're so enthusiastic for some road, then they can maintain it. Potholes, landslides, these things cost. Even the K5A needs upkeep, checking, and is anybody offering to pick up the tab? Oh no! If the state sanctions the preservation it stays the state's responsibility. It's a white elephant, Sonny. It's a liability. We have a duty to sell it off in the best interests of our constituents."

"Okay, so it's settled then," I said. "You've made up your mind."

"No I haven't! *We* haven't. You know better." He did not approve of my exaggeration. "Our minds are made up, yes. We know what we *want*. But voters are fickle cattle. We got elections inside a year, and we don't want to bungle anything. We can do without being insensitive, you know what I mean? That road's got to go. It's *going* to go. It's just that we don't want to look like teddy bear mincers while we're doing it."

"You would prefer to bow to public pressure."

"Exactly. Reluctantly. Yes. It would be best if we could make them think we're doing them a favor. Can we marshal anything like that?"

"I don't know. I could take a survey, if you like. To get familiar, to determine the trends."

"Ah. Ah, right," Tyson said. "Maybe you can make a start on the Heritage Action Local Ten. The media give them more space than anybody, and there's signs they could be thinking of poking their noses in. The last thing we need is Tens coming in from everywhere to maybe start camping on our tarmac."

"Very well," I nodded, "I'll look into it if you'd like me to."

"Just don't take too long, Sonny. We'd like to see a fast, comfortable solution on this one. We want to move on. We don't want to get hung up batting it to-and-fro. You know about these things. Can we rely on you to sort something out and come up with some answers? Huh?"

"I can't work miracles, Ty." I never made promises if I could help it. I saw no need here to make an exception. "You know how the public can be swayed, and especially if the media haven't some more vital tragedy or human drama to attend to. I'll sound out the situation. I'll let you have my report as soon as I can."

Tyson tried to get me to commit myself more, but failed. He had to retire, to be content with my assurance that I would do my best.

"Things happen so fast these days," Garcia Andalusia complained, "and there's so many things *to* happen. Somebody wants to knock down a building, and somebody else petitions to save its elevator. Do you know how many elevator companies have gone out of business since they became more or less obsolete?"

He didn't tell me, just shook his head.

"I guess," I suggested, "accommodations always have to be made when something new comes along."

"Oh sure. But this repplegee has affected every facet of our lives, everybody's life. And so soon! Just a few

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years, and the old order has collapsed and nearly all transport has gone off-ground. Huge changes. In a lot of cases it's certainly no faster, but lots of people sure do like to be able to lift and scud at the flick of a lever."

Garcia grimaced. "When pneumatic tires came in they only put wheelwrights on a pension. When steel kegs came in they only put coopers on the unemployment line. But this repplegee," he threw up his hands, "they seem to be looking to change *everything* to suit its convenience."

"It has certainly had a considerable impact upon our society," I granted easily.

"Hah!" he snorted, "that would have to be the understatement of the year. Of the decade. Of the century. Elevators, I mean to say. This is the latest. How are we at HALT to select out the most deserving elevators to preserve for posterity? The newest? The oldest? The highest? The fastest?"

Garcia shook his head again. "Some of our members are not as rational as they need to be, I'm sorry to say. When they hear, like now, how many elevators have already gone, through knock-downs and redesigns, they have a tendency to panic."

I sympathized. "I know how you mean. It's like the crash in the aircraft industry. The bottom dropped out, just like that, and it was so unnecessary. For real speed, to get about, we're going to need jets for quite a while yet."

He seized my point. "Exactly. There's no need to dive overboard just because your shoes leak. Elevators," he gestured, "now *they* are an endangered species. But we can't save them all, Sonny, can we? It *is* Sonny, isn't it? You don't mind me calling you Sonny, huh?"

"No, Sonny will do fine. It's what I answer to best."

"Great. Suits you," he complimented. "You've got a nice, relaxed disposition, miz. No offense, huh? I don't mean anything, uh, ulterior, you know? Only I meet so many people who are inclined to get excited if we don't at once throw the entire resources of Heritage Action behind stopping whatever latest tear-down project might come to notice, even if it's a slum."

"It must be a constant problem," I surmised, "sorting out just which particular venture ought to be given a top priority."

His eyes expressed his gratitude for my grasp. "That is it precisely, Sonny. We have to be realistic. We *must* be rational. We can mobilize hundreds of Local Tens all over the country, but we can't fritter this strength away chasing to save every last three-floor-and-basement service elevator, can we? Just because Uncle Roy got his first job in the store, or something."

"No," I conceded, "you have to select out. As I see it, HALT does itself a disservice if it tries to save too much. We can't freeze society. We don't want to become a living anachronism, do we, Mister Andalusia? The way I feel, HALT needs to be selective. It seems to me HALT needs to concentrate its efforts upon those buildings and features that contain all that is most significant and is most representative of the era."

His look to me was of one who had found a soul mate. "Very practical, Sonny, very practical. If there were only

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more like you, with such a sensible approach, my life would be a lot easier." He sighed. "You know the latest thing? I mean, *the* very latest thing? Came in this morning. Ski lifts."

It raised my eyebrows. "Ski lifts?"

He nodded. "That's what I said. They're being pulled down, too. Some local Local Tens have already had pickets out. What grounds do we really have for throwing our weight behind preserving such a specialized item, huh? The broad appeal, Sonny, it just isn't there. It's like climbers, if they want to be purists and climb without repplegee back up, then that's their business."

Garcia paused, smitten by a thought. "Your concern isn't with some sport, is it? Did you say something about cyclists? Or was it racing? There's nothing we can do about cheating with horses. Something like that you'll have to take up with the S.P.C.A. and the Racing Commission."

"No, no," I assured him, "my interest is in roads. And, Mister Andalusia, I'm in much of a mind with you. We should not dissipate our efforts, especially with the big things. For instance, there's some people, some HALT people, who want to support the Pedal Power cycling organization which wants to preserve this K5A Toll Road.

"Now, the K5A starts nowhere, and goes nowhere, and it's inland and not very scenic. On the other hand, in the next state they've still got a great chunk of their Touring Grand Coastal Freeway, which is almost as long and just about as good. I'd like to see both lengths of road saved," I lied, "but in all honesty I don't think HALT would be wise to divide its clout on this one. To my mind the Touring Grand Coastal is the finest example of roadway that combines esthetics with intended function and road building technology."

Garcia smiled. "So you are a champion for saving the Grand Coastal, eh?" he presumed incorrectly. "Have you had lunch? It's about time I had something to eat. Care to join me? We can talk some more over some minestrone perhaps, uh?"

"Fine. Thanks." Why not, indeed. It was never to be said that I had become so proud that I would turn down a free meal.

We had a very useful and a subtly constructive chat that, I like to think, became the reason why HALT preferred to invest the powers it could spare towards aiding the saviors of the Touring Grand Coastal, to leave little but to be lukewarm towards those advocates who would fight to retain the K5A Toll Road.

"We still have planes, plenty," he said, "and we still have emergencies." Raphael Kitt was a barrel of a man, florid, and apparently unabatingly resentful. "Roads make ideal emergency landing strips. Yet it's like they can't seem to rip them up fast enough."

"Yes," I agreed. "Once the reclamations started, every agency and council seemed to find an excuse to realize their real estate value."

"It's crazy if you ask me," Raphael growled. "They never consult anybody. Nobody lets *us* know. One day we got a strip, the next it's got bungalows on it, or has been filled in with trees by those blasted Greenies."

"But you don't *own* the roads," I

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pointed out reasonably, "and, anyway, you don't need over a hundred miles of road, even for your most critical emergency."

"You don't understand," he grumped. "Mostly there's not another class stretch like that for hundreds of miles. As it is it has become an easily identifiable landmark. It's not just some half mile that's got overgrown with weeds. Anyone in trouble anywhere near the K5A can get down anywhere along its length. That's at present. And that's the way we're determined it will stay. It's vital. In the interests of sheer safety."

"The K5A is a lot of road, Mister Kitt," I mused. "Mightn't you be better off buying a mile stretch here and there at intervals, for the F.W.W. to preserve its own interests?"

"Look, lady, we're not made of money," Raphael snarled. "We've done that already. We've got scrappy bits of strips all over the place now. They don't maintain themselves, you know. Our resources are strained as it is."

"Yes," I frowned myself, "but why should you *have* emergencies? Most commercial fliers use repplegee now as an aid to takeoff and landing, why can't fliers with wings do the same?"

"Because we're *air* fliers, that's why." His jaw set. "We've got pilot's licenses. We're not amateurs. We know what flying is all about."

"So when you get into trouble you need a clear area to land," I noted.

"Not just that," he snapped. "We want all the landing area we can get, to be able to land as near as possible where we want to go."

"So you'll be backing the Physical Exercisers, the roller-skaters, and cyclists and what-all, who want to save the whole of the K5A?"

"Absolutely. To the hilt," he declared adamantly.

"Uh-huh. Joggers, picnickers, campers along the median strips." I gazed thoughtfully at a point just above his head. "The road could well become a magnet for fitness freaks from all quarters of the land. I, uh," I sucked a tooth, "I could imagine an emergency landing by an aircraft unequipped with repplegee."

His face started to turn redder.

"If that road is retained complete, Mister Kitt, it will not remain bare, just to remain a clear hundred miles to be at the convenience of some wing flier who may get in distress.

"Roads *were* public property, and unless reclaimed and passed back into private ownership they *remain* public property. Once the fitness freaks think *they* own the road, the food and nut bars will follow, sporting goods concessions, and who knows what builders and peddlers to exploit the free opportunities."

His choler mounted. He plainly did not like hearing what I was saying.

"In a couple of years," I predicted, "if the P.E's get their way, you'll hardly be able to move on the K5A let alone try to land a winged flier on it. No, Mister Kitt. If you think ten thousand marathon runners in training, strung out with bicycle races going on between them and assorted folk literally hanging about watching the proceedings, if you think they'll all scramble out of the way just to let a winged flier hit the deck with the repplegee he should have, then you'd better think again, I fancy."

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I turned away, my job done. "Supporting the retention of the K5A for its potential as a landing ground for your members is sheer wishful thinking. You're just subscribing to a recipe for tragedy." I gave him a little bow with my head, "Good day, Mister Kitt," and I left.

"We have the Five Mile Street to the Butter Factory, though it's more like seven-and-a-quarter miles really," Museum Curator Xenia Yasmin Zifiola Smith said without apology. "It's not enough, Sonny, simply not enough at all."

I tested the tarmac with my heel. It was a fair roadway. Not the best, but considering that roadmaking and, more importantly, road upkeeping, was a disappearing craft, it was, yes, very fair.

"We have over five hundred automobiles here in top running order, and more than four times that many in store that we simply can do no more than, well, barely dust from time to time." Xenia looked a mite cross. "Sonny, we had twenty-two miles that used to take us to Duke's Falls. This wasn't enough, but it was *something*. They took it off us to rebuild a hill that used to be there, would you believe? Some smart engineer reckoned it had something to do with the water tables. Reckoned it should never have been removed in the first place." Her eye flashed. "Bulldust."

I concurred, although I was aware that in the old days many roads got bulldozed through with little thought for the ecological consequences.

"These vehicles of ours," Xenia touched a button on a hand-control, and one of the large hangar-like doors of the Old Butter Factory rolled back, "were not meant just to sit. They're like having a pet, a dog. They need showing off. They need to be taken for a run occasionally. Seven miles," she shook her head, "it's hardly sufficient to get most of them into top gear."

We walked. Some men and women in coveralls were attending the ranks of motors in various parts, a half-dozen of them, working in pairs, cleaning and polishing, one hood up, a motor running.

Xenia stopped to rest a hand on a cream and gleamingly chrome Bentley. "They're mad to have chopped our highway system the way they have." There was an edge of bitterness in her voice. "They just don't *think*. Our roads system took years, *centuries*, to lay down, yet here they've torn most of it up just to make a few quick bucks and knock off some lousy few dollars in maintenance costs."

Roads used to take such a slice from the budgets of some local authorities that I did not want to upset her by giving her argument.

"These gravity-repulsion units have got a lot to answer for, Sonny. They keep reminding us how destructive autos were, remembering the accidents, the collisions, just as though now we can float anything and everything off the ground, accidents don't happen any more. Ha!" she spiralled a hand skywards, "they're falling and running into things all the time. Look at that fellow, only yesterday, lost a piano off a hire platform. He could have killed more than just one poor old boy minding his own business in bed.

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"The way they lose things. It's not safe to walk around any more. And it's not just the big things. Bottles, cans. They're not policing it like they should. There's going to be more hooliganism, you mark my words."

"Progress always brings its own traumas," I said tritely.

"Progress? You call it progress? We'll live to regret going overboard for these repel-G packs, and multi-packs, and letting them out to just about anyone who asks. It's irresponsible, Sonny, that's what it's been. They say there's restrictions, but it's all a farce. If they can't get round the rules, there's always the black market or outright theft."

"Motor cars used to get stolen too," I reminded her. "They were often misused, weren't they? And people often drove them when they were unsafe, or without insurance, or when they were drunk."

"A minority," Xenia scoffed. "At least they were Earthbound. People living in a high-rise didn't have to make sure they pulled their curtains. And bolt outside doors. Front doors or balconies, I mean—it doesn't seem right somehow."

"Even before repplegee there were cat burglars," I said, but moved on, "What about pollution? These old motors still create a smell, don't they?"

Xenia patted the Bentley, had her back to it in defense. "Negligible," she claimed. "With the lead-free alcohol fuels they finished up with, burning was as near a hundred percent clean as you're likely to get."

Xenia's brows scrunched together in peevishness. "That's what's so annoying. They spent years, a century just about, perfecting the automobile, and then, just about when they had all their systems right, clean fuels, auto-navigation, crash-negation as near perfected as makes no difference, pshah!" her hand swept, "just like that it all gets screwed because this lab looking for super-conductors gets a by-product they're not even looking for."

She wagged a finger at me, "They radiate. They *have* to radiate. You talk about pollution. We don't even know *how* they might be polluting. They *say* these gravity-repulsion units don't put out any harmful rays, but just have one go overhead too close and see if you don't get flattened. Hah!" She nodded her head assertively, "Time will tell, you'll see."

I said, "Yes," which is always a good way to downplay opposition. To win more substantial approval I suggested, "It *is* odd, I guess, that motor cars should become abandoned just when their safety record was finally improving so. I remember them, of course. They *were* exciting. You certainly have some magnificent vehicles here. Lovely examples."

If I had caused her any antipathy it was easily overcome by my showing genuine admiration for some of the charges in her care. Motor cars *were* such engineering miracles. The efficient control of continuous explosions by means of valves, pistons, and firing devices coordinated to incredibly precise tiny fractions of a second had always made me marvel. The power units were such lumps of metal, had so much interdependence of parts, were so very much more complex than any electric motor. It was always a wonder to me

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that the simplicity of electric motors had taken so long to achieve ascendancy.

Xenia loved her automobiles. Following her, it was easy enough for me to steadily outline the merits of the Touring Grand Coastal Freeway as against the drawbacks of trying to save the K5A Toll Road. Xenia would have to lift her carriages anyway to whatever site was elected, and the distance to either of the leading contenders was comparable.

I plugged the scenic advantages of the Grand Coastal, let her know that the F.W.W. had dropped its Whole Road drive, and how HALT was unwilling to divide its considerable forces and had opted to subdue its K5A support.

Xenia, her nostalgic yearnings apart, was not a fool. She knew that in unity was strength. HALT was too influential to ignore.

I was able to depart with her assurance that she would switch the determinations of her Auto Holders Roads Righters to join to help concentrate the majority lobby. Unanimity offered a so much greater chance of victory. Squabbles between the groups could be resolved later.

When I lifted off in my personal two-seater customized side-slide fan assisted capsule, I was well satisfied that my afternoon had been well spent.

The rest was not too difficult. With a couple of biggies like the A.H.R.R's and HALT on side, persuading other interested parties where they might best apply their pressures was merely a matter of stressing logic.

I worked leading members of Amalgamated Sports and Recreation Interests separately—the National Cyclists Association, the Physical Exercisers, and Bob Dubuski of the Skate and Scooter Shooters—so that A.S.R.I., the body, the last biggie, lent its priorities elsewhere than to the K5A Toll Road.

From here on there was a minor hiccup or two, the old chestnut of public right of way raised by the Walkers Tracks and Byways Preservation Union and, of course, the usual quantity of red tape. It was familiar ground to me, presenting no real problem.

I was able to move on, to line up my perks that would be incoming from ones more easily managed, those who might covet taking up certain sections of the K5A should it become available. The K5A had two service centers, which entrepreneurs rather sought these days to convert into an Original Droppe Inne, or The Racing Hot-Rod Shed, or The Old Roadhouse Massage Parlor, or whatever.

There were also three generous laybys, one a look-out on a bluff with the best view on the entire road. I got Recuzi Dor, the billionaire scent czar, teed up for that one.

Then there was the farmer, one of the best, not short of a dollar, who carried a family grudge going back to his grandfather's day, World War One, when the army had first driven a path through the middle of his property. It was a technicality I stumbled upon checking out some of the pertaining legal attachments. The layers of the K5A had used the instrument of "available to facilitate the movement of military stores and equipment in time of war, and subsequent military necessity" to override the objections the farmer had proposed at

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the time. The words "subsequent military necessity" had been conveniently interpreted by the roadbuilders and the courts to mean "in perpetuity."

Offered a chance now to be able to plow a stretch of road under to rejoin his divided land was too tempting an opportunity for the farmer to decline. The prospect of another buyer perhaps intervening was an idea not to be countenanced, whatever the price. It was a price that was quite gratifying.

Thus, finally, I was able to return to Treasurer Tyson Corroloy with virtually a lay-down hand for him, to look forward to receiving my percentage of the real estate action, a bonus that I think I enjoyed more than actually getting his signature down on the formal contract with my firm.

It was a nice job jobbed, as my dear old dad used to say, and my dear old dad cropped up again some three months later when I answered an invitation to go see Governor Imcriss Rools while we both happened to be visiting the federal capital.

I didn't know the governor as far as I knew, wondered how he had found me, and why, but he greeted me like an old friend, hand held out, "Sonata, is it? Ha! Last time I saw you you had pigtails. You look great. You've grown up great. And how's your sister, Capone?"

I laughed. "Caprice," I corrected him. "Cap. Most people think it's short for captain. You knew dad, did you?"

"Oh sure. Bill Jumbaya and me, we worked pretty close in the old days. He moved earth, I had holes to fill and marsh to recover. He helped me build the One-O-Eight six golf-course spread out at Mia-Mia Creekland. I'm still proud of that. Still drawing golfers from the world over. Top class. Offers a choice unequalled anywhere."

"Your doing, eh?" I said.

"Sure is. Still got a stake. I'm on the board. And with the Hillrise Marina, too. Drink?" He didn't wait, poured me a Tokay. "Your dad was in that as well. Did a lot of the terracing for the locks. Rows of canals all up the hill."

He became rueful as he handed me my glass. "These repplegees are hurting the business a little, but not too badly. Most people still don't mind using the locks, and it's quite an outlay to get the authority, let alone the unit, that will lift a boat out of the water. Usual thing," he shrugged, "it gets to be a status symbol, I guess. But in my opinion if boats were meant to fly they'd have wings."

I nodded, sipped my drink. "They belong in the water."

"Right. And they come back to the marina to roost, so we mustn't grumble." He swigged his own drink, and sighed. "Ah. Your dad was a fine man. Liked Meyerbeer and Chabrier. He did me more than one favor. Then I ran into Tyson Corroloy, you know him? He's in town for the meeting of state treasurers. And he told me what a great job Jumbo Roadbreakers was doing on their old K5A Toll Road. I remembered it was your dad's outfit, just had to get you to look me up."

"Yes, well, Cap's in charge of the plant now. She's the one who handles the actual terrain recovery program. Perhaps you should have invited her, although she's usually happier in boots and hard hat than civilized attire."

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"Ha-ha. Yes, I remember her. She poked out her tongue at me. She couldn't have been more than six. Didn't go for sissy stuff even then. Little terror, I reckon. Capone." He nodded. "That's why I called her Capone."

"She was always dad's favorite," I said without rancor. "Dad wanted boys but got two girls, but he made us boys anyway. Cap was just more successful that way."

"You *do* get along?"

"Oh sure. Oddly, I take more after dad in looks. Cap's dark, just like mother. Mother and dad got along okay. Cap and me complement each other in much the same way, I guess. Yes, she leaves me to do the head stuff, and is very content to turn concrete into lawn for cows to graze or gliders to land on."

"Great." He smiled, pleased to relax his concern. "You're both Jumbo Roadbreakers, then?"

"Full and equal partners." I assured him.

"Great," he said again. "Well, you're just the people. You come highly recommended, huh?" He beamed. "I'd like to put some work your way, and not just for old time's sake.

"See, at home we have this redundant stretch of highway, you know? Only there's agitators wanting us to keep it, for long distance runners, old automobiles, and stuff like that. No good. It's becoming a liability and we want to get rid of it. It's a nice long stretch known as the Touring Grand Coastal Freeway. Maybe you've heard of it? Well, what we'd like you to do is . . . " ■

ON GAMING

(continued from page 118)

are nine boards, each consisting of 64 squares of dark and light green, similar to a regular chess board. But there are also forests, rivers, bridges, castle ruins, and meadows that fill the board.

The other major change is the effect of terrain. A card included with the game summarizes the terrain restrictions. For example, the king cannot move into a castle ruin, the rook cannot enter the forest, and the bishop cannot enter a river or pond. All the pieces have similar assorted restrictions and the card helps players remember who can or

Up to four can play, with the standard 16 pieces moving exactly the same as in chess with two interesting exceptions . . . the pawns may move up to three squares forward, diagonally, or sideways. In addition to its familiar L-shaped move, the knight can move three squares on any rank, file, or diagonal. can't go where.

As I said, I was not prepared to like the game. Unlike war games, the terrain restrictions seemed to follow no logic. But in playing *Sceptre*, its virtues became apparent.

There is opportunity for daring escapes, moving pieces behind the safety of a castle ruin. Pawns become especially dangerous with a large field of rear spaces ready to reward the player with a new piece to replace one previously captured.

While a three-person game might easily get lopsided, *Sceptre*, surprisingly enough, offers a good deal of fun for two and four players looking for a break from the overly familiar challenge of chess. ■

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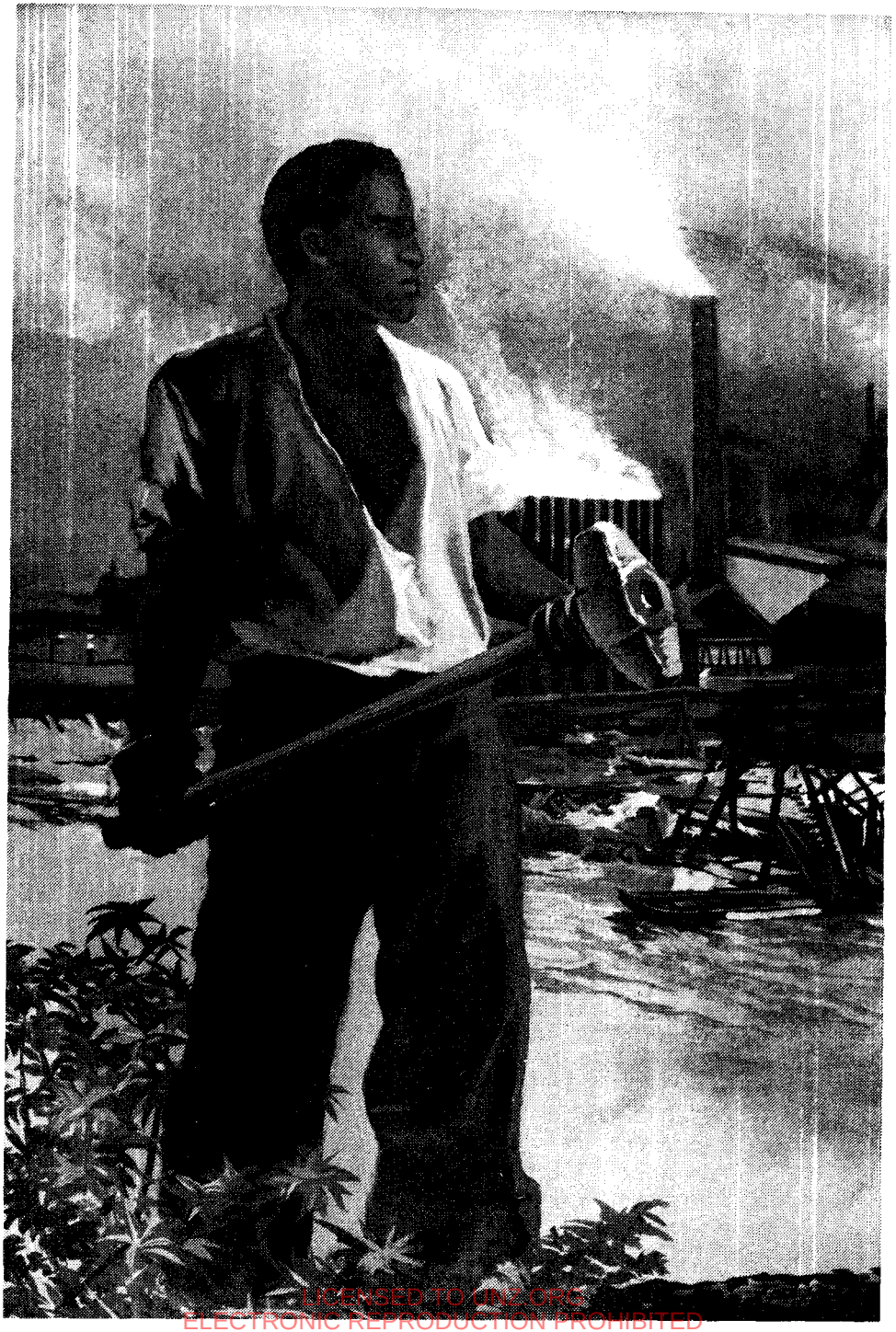

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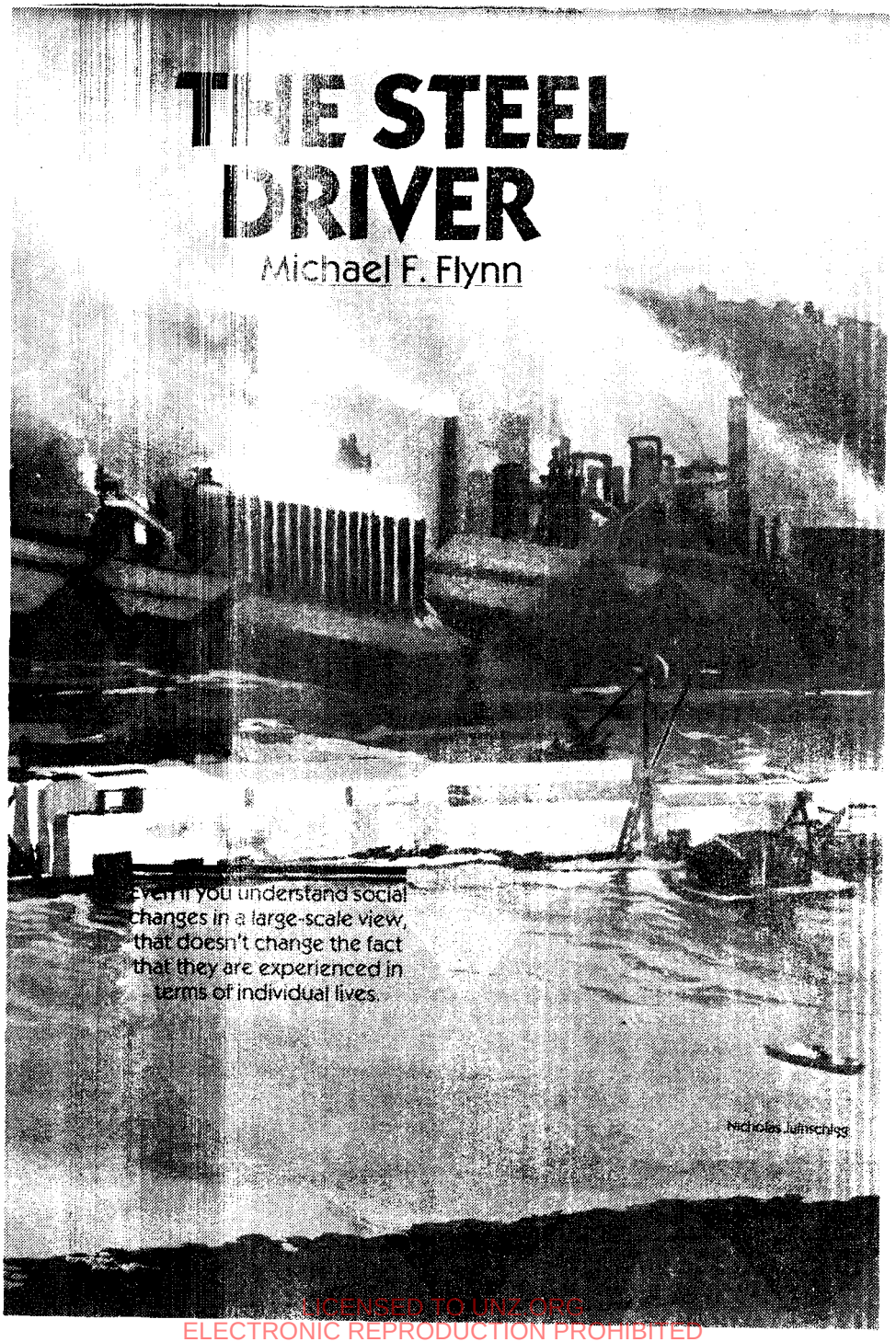
THE STEEL DRIVER

Michael F. Flynn



Even if you understand social changes in a large-scale view, that doesn't change the fact that they are experienced in terms of individual lives.

Nicholas Jainschigg

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Figures out of a nightmare sat around the table in the dark, candle-lit room. Men with the heads of birds and beasts, sprouting horns and antlers and feathers. Buffalo, eagle, Dall sheep. A manic Aegyptian pantheon decked out in high starched collars and plush waistcoats. The room vibrated slightly from the machine shop belowstairs, whence came the stink of hot oil and the muffled clanking of metal upon metal.

The man at the head of the table held a calipers in his left hand and dividers in his right. He gripped them ceremoniously, as if they were orb and scepter and he, a king. And, in a way they were; and so was he.

In the candlelight, the other faces were indistinct, blurred. But that mattered little, since Brady Quinn knew who each man was and where he sat. He let the silence linger for a moment longer, then solemnly intoned: "Fiat lux."

The first man on his right lit a kerosene lamp and extinguished the candle, saying a few words as he did so. Quinn let the words wash over him. He had heard them thousands of times already and all meaning had been wrung out of them. He pronounced his own cues without conscious thought.

One by one, the other men brightened the room. Kerosene lamp yielded to gaslamp, then to arc lamp, to limelight, to acetylene lamp, to incandescent electrical light, to mantled gaslamp. As the brightness increased, the demons around the table became middle-aged men in curious headgear. Not so ominous, after all; and perhaps a trifle silly-looking. After the last lamp had been lit—a strange one, a prototype in which an electrical current caused a gas to glow—the men chanted a rhythmic bit of doggerel. The lines were spoken in measured cadence; the words blurred by long familiarity and the lack of perfect unison.

Ceremony, thought Brady Quinn. It is our tie to the past. It is comfortable, like an old shoe; but, like an old shoe, we can wear it without feeling it. But, if the words themselves had ceased to move him, the sentiments behind them had not. He raised his own voice on the final lines, speaking them clearly and forcefully so that the others in the room might hear them and, perhaps, listen to them once more:

". . . to measure and divide; and more:

To bring in time an end to strife
And plenty to the poor."

He laid the calipers on the table before him and placed the dividers carefully atop them. "The 858th meeting of the Associates," he announced, "being the 2,675th meeting of the true Babbage Society, is now in session. Cushing's Rules of Order are in force."

"Move we suspend the Rules."

"Second."

"Call the Question."

"Second."

Brady's lips twitched. The other endearing thing about ritual was that it was so predictable. "All in favor?" he asked.

A chorus of ayes. And a single nay—from Dayton Black, of course. Everyone grinned as they removed their lodge caps. Quinn wondered what would happen if Brother Dayton were ever to vote aye. Would the roofbeam crack? The Earth spin off its axis? The Secret

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be divulged? He wondered if Dayton voted nay from some peculiar sense of obligation. A duty to be passed on from father to son. He imagined Dayton's great-grandson a century hence, still casting the ceremonial "nay" vote.

But nothing stayed the same, he chided himself. If there were anything their long researches had taught them it was that. Change was the only constant. Our great-grandsons will not live as we have. He tried to imagine life in the next century.

Self-propelled wagons and stagecoaches, surely. Already there were rumors from Germany. A man named Benz. But what would railroads be like in the 1970s? Or riverboats? Brother Kendall had calculated figures for air travel that seemed bizarre. Surely there was a physical limit on the size of a balloon, or the lifting power of hot air!

Perhaps, a new sort of fabric, or a new lifting gas, or even an unimaginably different means of propulsion. . . .

Of one thing he *was* certain. Grown men in 1972 would not chant meaningless doggerel while wearing ridiculous hats. Except at political gatherings, of course. Fraternal orders and their binding rituals were already growing less important. The signs were there, in the equations; and the Associates would change with them. But, if the old ceremonies would vanish, what new ones would replace them? The ritual, the tradition was necessary. It was the sole anchor that kept a man from being tossed—will he, nill he—by the tides of change that were about to sweep the country.

And there was something stirring in the way the gradually brightening lights changed the ominous into the ordinary; something symbolic in the way reality emerged from myth.

Brady Quinn sighed and picked up the agenda. Sooner begun; sooner done. "The first agendum," he read, "is the report on trends in the mechanization of work." He glanced around the table. "Brother Randall?"

Randall Carson cleared his throat and flipped his report open. "As you all know," he said by way of preamble, "immediately upon the close of the late War, the number of patents issued by the federal government began climbing at an exponential rate, even after normalizing to the population base. This, of course, was the explosion that the Founders had hoped to engineer." He paused and looked at Quinn.

Quinn returned his gaze evenly. *No you don't, Randall, lad. Successes do not cancel out failures. There will be no more engineering. I will not alter my mind on this issue.*

"We have analyzed this trend," continued Carson, "and have determined that it will achieve equilibrium at the close of the first general war, about 1920 ± 5 years."

Quinn stirred in his seat. There was still disagreement over what to call the coming conflict. The First German War. The First General War. The First World War. Shelton, Belleau, and the other Founders had been unable to forestall it. The Society had no operatives in Europe. But the older generation *had* succeeded in triggering a technological eruption in the United States. The objective had been to form a counterweight to German industrial might. Something to curtail the conflict, so that the "ul-

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timate explosive'' would not be invented during the course of a stalemated war. *Was what we did really the necessary means to that end?* However, that led his thoughts down paths he did not want to follow; and he yanked his mind back to the present. *Let the dead stay dead.*

''What it amounts to is this,'' Carson was saying. ''We are presently passing through what is effectively a mathematical singularity: a sudden leap from one equilibrium level to another. During these fifty years the daily life of people in the cities of the Western world will change more than they ever have before, *or will afterward!* And remember that social change is *always* a consequence of technological change. After 1920, the rate of technological change will be fast enough that people will become conscious of it during their own lifetimes. I don't need to remind you what an important psychological benchmark that will be. Because the singularity is only fifty years wide, we must move quickly and decisively if we are to retain our financial advantages. Where shall our investments prosper most effectively?

''One of the key issues which we must resolve is the replacement of human labor by engines, a process for which we have coined the neologism 'automation.' We must know more about the parameters of this curve. Presently, allowing for statistical error in the estimates, the data permit of several curves. Which of them is actually in effect will have important ramifications for our investment portfolios.''

''Get to the point, brother,'' growled Dayton Black.

Quinn made a steeple with his fingers. He pursed his lips. ''Yes, what is your recommendation, Brother Randall?''

Carson put the report on the table. ''Field work,'' he said. ''Our man in the patent office has posted several new inventions to our attention. One of them, a mechanical, steam-powered drill, will be put into use shortly by the Chesapeake and Ohio Rail Road Company, at Big Bend, West Virginia. We should send one of our men to that area to make observations on the equipment and estimates of its reliability and the likelihood of its adoption by other rail roads. Gentlemen, not every seed sprouts; and we need to know which to cultivate. Do we invest in this company or in another? And of course, there is the longer term advantage of further refining the Equations for our successors.''

Quinn stifled a laugh. Randall was a card. A real gallus-snapper. He knew these men were serious researchers; but he also knew they carried their hearts in their wallets. Come to that, Randall was fond of the fast life himself. If only he weren't so blatant in his mercenary appeals.

''Who is to go?'' asked Joel Harris. ''None of us, I take it.''

Black rubbed his nose and cackled. ''West Virginia? Not hardly. Brothers Randall and Brady can pick the man. Let's get on with this.''

''No, we'll settle it now,'' said Quinn. ''It won't take but a minute. Randall, get the cards.'' Carson went to fetch the card drawer and sorting rods while Quinn made some notes. ''We need a man with a good eye for machinery. An engineer, preferably; and he should be

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based no farther away than, say, Pittsburgh, Cincinnati, or Knoxville."

"He should be in good physical condition," threw in Harris. "Those West Virginia hills can be mighty rugged."

Carson set the card tray on the table. The tops and sides of the cards were perforated with holes, some of them notched open. "An engineer, did you say?" He consulted a dog-eared, black notebook hanging by a string from the corner of the drawer. Then he counted off the holes from left to right across the top edge and inserted rods through two of them. One by one, he put rods through the hole combinations corresponding to the other requirements Quinn had drawn up.

When he was done, he gripped both ends of the rods and lifted. Nearly all the cards in the drawer came up with the rods, held in place by at least one un-notched hole. He shook the deck and three loose ones fell out. These were the only cards for which all the selected holes were open and, hence, contained information on Associates who met the requirements. Joel Harris reached out and grabbed the cards, while Quinn wondered idly if it would be possible to use electrical lights and some sort of light sensitive receptor to read the holes. That would speed up their computations on the Babbage engines enormously.

Harris flipped a card at him. "There's your man," he said.

Quinn read it. Reuben Judge. Thirty years old, but in excellent physique. Mechanical engineering degree from Western Reserve. Now working for the Associates guised as a reporter for the Cincinnati *Star*. Quinn had met him once. A good man.

He nodded to Harris. "Very well. Arrange it."

Reuben Judge had been on the road for two days since leaving the riverboat at Charleston and the dust of Summers County was on him when he spied the movers ditched by the side of the wagon trace.

He reined in when he topped the ridge and studied the valley below him. It looked like every other valley in the ridge-and-valley province of West Virginia, save that there was a cluster of figures gathered about a wagon. The stream running alongside the wagon trace had undercut the bank; and, unable to support the weight of a fully-loaded Conestoga, the bank had caved in, leaving the wagon with the right rear wheel in the ditch. He saw a man, a woman, and three youngsters. He figured them to be a family cutting out of the hill country for the West. The man and the oldest boy were pushing the back end of the wagon while the woman pulled on the team up front. The two children stood by, looking frightened. As well they might be, Ben thought. Everything they owned was in that wagon.

Ben clucked to his horse and started down the ridge. The man saw him coming and stopped his labors. He said something to the boy, and the lad darted off out of view behind the wagon. The man waited for Ben, mopping his face with his kerchief.

When he reached the wagon, Ben reined in and nodded at the wagon. "You folks look like you could use a little help."

The man nodded warily. "Mought use another pair of arms round the back

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end." He spat into the grass. "I don't place you, mister. You from here 'bouts?"

"No. The name's Ben Judge, up from Cincinnati. I'm on my way to Big Bend."

The man nodded and seemed to relax. He stuck out his hand. "Jeremiah Duncan," he said. "Of the Bear Creek Duncans. These be my family. Sorry to be so stand-offish, mister, but there's feudin' in these parts. I thought you be one o' them Harveys out a-huntin' "

Ben nodded. "Well, I'm not, so you can tell your boy to put that squirrel gun up."

Duncan looked startled, then approving. "You don't miss much, do you, mister? You sure you're not a West Virginy man?"

"Born in Kaintuck," he answered in his boyhood accent. "Down to Harlan County. But my folks moved to Ohio when I was a tad." He dropped from his horse and went to inspect the wheel. Duncan gestured and one of the children, a girl, ran to hold the horse's reins.

The wheel was hanging halfway down the bank; and the wagon was tilted so that it rested on three wheels and the wagon bed. Ben hummed to himself as he sighted along the bed. Work equals Force times Distance times the Cosine of the Angle. The road grade ran above the centerline for the rear axle. Ben estimated that the wagon's center of gravity was below the pulling axis of the team. The more the horses pulled, the more the rear wheel was pulled into the bank. They'd have to *lift* the back end of the wagon. Two feet up and two feet over. Four horsepower out front. That meant he'd have to lift. . . . He made the estimates in his head. Maybe he could turn the wheel; use it as a combination lever and pulley to make the wagon climb the bank. Well, "nothing done unless begun."

He leaped down into the creek, putting himself at shoulder level to the wheel. The water whirled around his calves and he planted his feet carefully. "You folks movers?" he asked. It was just polite conversation. It was obvious that they were.

Duncan took it the wrong way. "What of it?" he bristled. "That don't make us no accounts."

"Never said it did," replied Ben easily. "Didn't I just say my own family were movers? I know there are some folks who look down on 'em, but there's no law says a man's got to live in the same place he grew up. Come to that, less'n those folks are Shawnee, they must have movers somewhere back in their families, too."

Duncan nodded and he and his boy took their places at the back end of the wagon. "Hell, mister, don't you know? Even the Shawnee say they come here from somewheres else."

Ben put his shoulder to the wheel and grabbed one of the spokes. He took five long, even breaths. "Now!" he said.

The men grunted with effort. Frontwards, Ben heard the horses pawing the earth as Duncan's wife guided the team. Ben pushed up on the wheel, making it turn; using its mechanical advantage to roll itself back up the bank. The muscles in his back and shoulders bulged and his face stretched with the effort.

Then the wheel was high enough and the horses took it from there. It rolled up and over the edge of the bank. Ben

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staggered as the force was removed. The wife led the wagon and team away from the stream. The children laughed and clapped their hands; and the boy waved his hat and let out a whoop.

Duncan gave Ben a hand up from the stream. "Don't rightly know how to thank you, Mister Judge. What's your line, circus strongman?"

Ben shrugged. "No, I'm a writer for one of the Cincinnati papers. I come by my strength natural. That, and working the riverboats when I was younger."

Duncan looked at him shrewdly. "A reporter, you say? And headed for Big Bend? You may need more luck'n me."

"Why's that?"

"Took my family by there on the way out. Thought I'd let 'em watch the rail road folks blastin' that tunnel. But they wouldn't let us near. The rail road dicks. They said they was closed to the public and especially to the newspapers. They was very firm about that, mister."

Ben rubbed his jaw thoughtfully. A closed site? Probably due to the outcry over the Hoosac tunnel business. All the roads were being cautious about who they let on site.

"Say, there, Mister Duncan," he said. "There is a way you can repay me. How about you and I swap clothes?"

The mountain man looked at his own worn homespun, then at Ben's store-bought city clothes. He chuckled, getting Ben's drift. "Well, I sure could use a set of Sunday-go-to-meetin's."

"Henry!" bawled the captain. "New man for you! Show him the ropes!" In the din of hammer on steel he had to shout to make himself heard. It was dark in the tunnel. The only light came from kerosene lamps hanging from the timbering. The air was close and still and stank of sweat and blood.

The big man nodded and put down his sledge hammer. He looked Ben over, top to bottom, and spat into the corner. "What's your name!"

"Ben! Ben Judge!"

"John Henry!" He stuck out a meaty paw and engulfed Ben's fist. He squeezed hard. Ben looked at him and squeezed back. After a moment or two, Henry grunted and released.

Henry led him away from the tunnelhead to where the noise and the heat were more bearable. They sat on a pair of powder cans. Henry reached out with a boot and toed a pile of tackle on the ground. "There's the ropes," he said.

Ben looked at the ropes then back at Henry, trying to decide how to take it. Tribal initiation rite? He had read some of Dayton Black's monographs on the "hazing" of newcomers by various societies and peoples, though he hadn't paid them much mind at the time.

Henry was big, no two ways about it. There seemed enough of him for two ordinary men with maybe a little left over for a midget. Two-twenty, maybe two-thirty pounds, with most of it in his chest and shoulders. His arms were as big as most men's legs. He was stripped to the waist, and his skin was the color of rich chocolate. He looked to be about thirty-four years of age.

Henry reached out abruptly and seized Ben's left hand by the wrist. He turned it over and opened the palm. Startled, Ben did not resist.

After a moment, Henry dropped the hand. "What you doin' here, Ben Judge? You ain't no steel drivin' man."

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Ben rubbed his wrist where Henry had gripped it. "Never was," he replied. "I worked the riverboats."

Henry snorted. "When? When you was a chile? They ain't nary a callus on your lily-white paws." He displayed his own hands: as big as small hams, knotted and scarred.

"I'm strong and I'm willing," Ben told him. "Is there more?"

Henry stared at him speculatively. He turned his head and sent a stream of tobacco against the far wall. "Maybe. You come with me. I'll swing. You hold the steel."

Back at the tunnelhead, Ben watched his new strawboss start a hole with a hand mallet and a short spike. The he took a longer spike and set it in the hole. "Here, hold this like so, perpy-dicular to the wall!" The other workers nearby paused to watch, leaning on their hammers or against the wall. Some of them grinned.

Ben nodded to show he understood and gripped the steel rod. Henry spat on his hands and hefted a sledge hammer. It was a twelve pound sheep-nose hammer with a four foot long switch handle. Henry extended the hammer straight out to his right. The handle bent nearly halfway down.

Seeing Ben's astonishment, Henry explained. "I keeps my handles greased with tallow. That makes 'em limber, so's I don't jar my hands and arms."

He planted himself five-and-a-half feet away from the spike and threw the hammer so far over his left shoulder that it hung down to his knees in back. Then he swung in a long lightning-fast stroke that met the spike dead on. Ben felt the shock run up his arms. The spike sank deeper into the rock.

Ben licked his lips as Henry recovered the hammer with smooth, fluid grace and delivered another blow. The blows came in rhythm, the tempo gradually quickening. The spike became warmer and warmer as some of the energy was transformed into heat. Ben stood rooted to his spot, not daring to move. If Henry were to miss the spike, the sledge would mangle Ben's hands, maybe worse.

He tried to estimate the kinetic energy involved, doing the arithmetic in his head. Henry was swinging a twelve pound sledge, a mass of 3/8th slugs. And it was moving at, what? Say 110 feet per second. And K.E. = $(mv^2)/2$; so . . . That would make it a bit over 2,200 foot-pounds delivered over a nineteen and a half foot stroke. Like dropping the hammer from the top of a nineteen-story building. And *that* meant . . .

If Henry missed the spike, it would mangle his hands, or worse.

Ben swallowed. Wonderful thing, science. It let you quantify just how bad off you were. Henry's hammer was a blur. He decided not to look at it and looked at Henry instead.

And Henry was looking at him, not even watching his swing at all. Ben blinked and pasted a smile across his face. The steel driver dipped his head in acknowledgement.

He checked his swing and came over to inspect the spike. "That's deep enough," he decided. "You can pull it out now."

Ben found that he had to force his hands to open. He shook them to get

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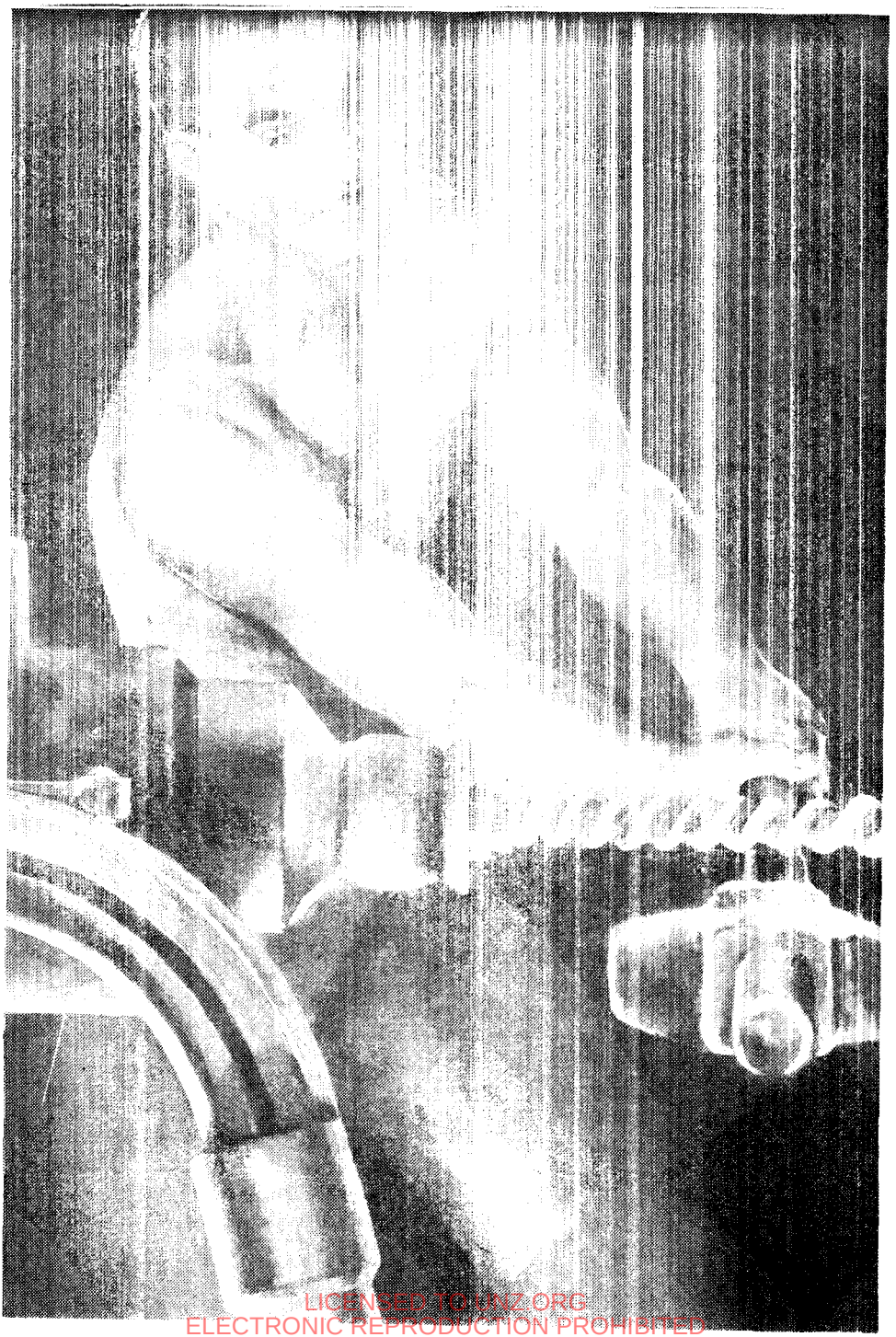

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some feeling back. His fingers hurt when he flexed them. When he tugged at the spike, it didn't budge; so he set his heels and *pulled* and it came out. He handed it to Henry.

Henry looked from the spike to the hole and back. He chuckled. "I'm a-gonna call you King Arthur from here on. I set that spike a good four inches deeper than I needed."

Ben was surprised that Henry knew the tale about Arthur and the sword in the stone; but then, he reflected, it was just the sort of fable that a steel driver would find interesting. And, as far as that went, uneducated didn't mean ignorant. Not yet, anyway. Brady Quinn had once told him that that ideon was eating its way into the heart of American thought and that, someday, diplomas would mean more than actual expertise.

They drilled powder holes the rest of the day. Ben made the starter holes with the hand mallet while Henry drove the steel. It was hot in the tunnel. Sweat rolled off him. He stripped off his shirt and tied it around his waist. The rock dust was thick in the air. It was in his eyes and his hair; and every breath pulled some into his lungs. It coated his sweaty body like concrete. He thought he knew how the Gorgon's victims had felt.

When he asked Henry who made the chalk marks that showed where the holes were to be drilled, Henry told him that one of the powdermen, Sparks, marked them off. Ben thought that Sparks was a hell of a name for a powderman.

Henry wore out several spikes during the day and kept sending his shaker back to fetch more. Ben discovered that the shaker normally held the spikes in place by means of a pair of long tongs, so that he stayed well out of the arc of the hammer. The first time he saw that he gave Henry a look, but the big man just grinned and shrugged.

Henry let Ben drive some of the spikes himself. Swinging the sledge was a catharsis. The tunnel was a carillon: The steel rang. The hammer rang. The rock walls echoed. At first, Ben tried to match Henry, stroke for stroke; but he soon gave it up. No one could keep up with him. To get at some of the holes on the ceiling, Henry stood on two powder cans and swung *up* from between his legs, striking nearly as hard and as fast as he did upright. Ben never saw him turn a stroke.

When the holes were finished, the steel drivers retreated up the shaft and let the powdermen do their work. The latter stuffed dynamite into the holes with blasting caps and tamped them tight. One of them ran a fuse back and lit it with a kitchen match. It sputtered and caught and hissed across the floor. "Fire in the hole!" he cried and ran for cover.

"Easy job," Ben commented.

"Yeah," agreed Henry. " 'Cept sometimes the fuse goes out. Or seems to. And then someone has to go check. You want to go?"

Ben shivered. "Hell, no."

Henry sat on a powder can and leaned his back against the tunnel wall with his feet stretched out in front of him, crossed at the ankles. He whistled, but Ben didn't recognize the tune.

When the tunnelhead blew, the whole mountain seemed to jump. Rocks fell

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and dust plumed the air. Henry didn't even blink. There was no sound: It was more of a physical blow. Ben's ears hurt as if boxed. Farther along the tunnel he saw a man double over in agony holding his ears as blood seeped between the fingers.

Henry caught his attention and pointed upward with his eyes. Ben looked and saw that the rock ceiling had fractured and the wooden support beam had cracked. "Cap'n really ought to replace that'n," Henry remarked. Ben thought of the tons of rock over their heads and paled. He wondered if there might not have been an easier way to get a close up look at the steam drill.

John Henry sat upright and braced his hands on his knees. He looked Ben in the eye. "That's what more," he said. When Ben looked a question back at him. "You asked what more there was to steel drivin' than bein' strong and willin'."

Ben decided then and there to be more careful what questions he asked Henry. The big man had a funny way of answering.

The food in the chow line was greasy and unappetizing, but there was plenty of it and Ben was surprised how good it tasted. *There's no savory like hunger,* he thought as he sat under a hickory tree in the moonlight. Farther down the mountainside, he could see the campfires burning brightly and shadows moving around about them. He sat and enjoyed the quiet where he was. A hoot owl called in the darkness and took wing in a puff of silence. He watched its silhouette across the stars.

Henry appeared and planted himself next to him. "You got grit, son," he told him. "You'll do." He swabbed the gravy in his tin plate with a hunk of sourdough bread and chewed on it thoughtfully, not looking at anything in particular. Ben didn't answer him.

"They tell me there's sunlight most the time," Henry commented. It was such an odd remark that Ben turned his head and looked at him.

"What do you mean?"

Henry pointed to the sky. "All day long, it's black as Satan's heart inside the mountain; then, when we come out; why, it's just as black out here!"

"That's what comes of a twelve hour work day."

Henry turned amused eyes on him. "Now you wouldn't be one of them so-see-alists, would you? Agy-tatin for a ten hour day?" He chuckled. "It's a day's work for a day's pay. Or haven't you heard?"

"A day's twenty-four hours long," said Ben.

That remark seemed to touch something inside the big man. He looked away again and toyed with his food, just moving the potatoes around in the gravy. "So it is," he said. "So it is." He turned back to Ben. "But looky here, mister soft-hands. No one owns me. I don't like it, I can walk. Head West. No matter how you slice the cheese, twelve is a damn sight less than twenty-four."

"And no one owns you. Not even for the twelve."

Henry looked at him sharply. "You figured that out, did you?" His voice was dry.

Ben shrugged. "Then you were a slave?"

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"For a while," he admitted. "For a while. Then, by-and-by, I followed the pole star and wasn't one no longer. I toted a rifle for Sherman and then there weren't no more slaves anywhere. But there was slaves on both sides of my family."

"I don't understand."

"My . . . white forefather, he was a slave, too. Back in the long ago time, before they made it a race thing. He sold hisself for seven years and took the middle passage from England to Carolina." He recited it, as if remembering an old story.

"Indentured servitude wasn't quite the same thing as chattel slavery."

Henry grinned at him. "You shure do talk pretty. Indentured servy-tude." Henry tasted the words, repeating them, making them his own. "You be right. Those there indentured folks, they was never *property*. But they was in the fields, shoulder to shoulder with my mammy's folk. Sometimes, they was worked a lot harder, too."

"That's because they weren't capital property," Ben said absently. "The owner had no long term investment to protect."

Henry seemed not to have heard him. "And come the end of their seven years, why maybe they hadn't saved the money to pay off their tick and they had to sign up for another seven." He jerked his hand and slung the remnant of his meal into the forest. "There, let the birds and 'coons have the rest."

"Isn't that cruelty to animals?" asked Ben.

A shout interrupted Henry's chuckle. Ben peered into the darkness at the figure making its way toward them from the campfires. There was a hubbub of talk in the background. "Who's that?" he asked.

"That's Sparks, the top powderman, and he do look excited 'bout something."

Sparks was an Irishman, skinny with a prominent jaw. His corduroy trousers buzzed as he ran. "Wisha, Johnny! She'll be here in three days," he said, trying to talk and catch his breath at the same time. "The word just come down the line from the dispatcher in Roanoke. He's a black-hearted Sassanach, but he seen the bill o'lading hisself."

He means the steam drill, thought Ben. Ben's contacts had told him that the contraption would arrive at Big Bend sometime during the week. He was glad it would be soon. Ben had no intention of making a career out of steel driving.

"Well, Johnny, won't ya be sayin' nothin'?" insisted the Irishman. "They're bringing in a mechanical steel driver, they are."

Henry was chewing on a stem of grass, seeming to pay the announcement little mind; but Ben could see the creases at the corners of his eyes.

"No they ain't," he told Sparks finally, speaking around the grass stem. "All they's bringin in is a steam drill. Not a steel driver. A steel driver, he be a *man*."

The day the steam drill arrived, just about everyone found an excuse to leave the tunnel at one time or another so they could go stare at it. The sole exception was John Henry, who swung his hammer and ignored the talk and speculation. He looked up briefly when Ben told the captain he needed to visit the

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latrine; grunted but said nothing; then turned his attention again to his work.

Ben loved fine machinery. There was something about it; the way all the parts meshed and worked together. Even the way it felt and smelled. The smoothness of the steel, polished to 8 microinches. The odor of the lubricants. The rods riding smoothly through their couplings. The hiss of the steam, or the hum of the bearings. He liked things that did what they were designed to do; and he liked things that were designed to do jobs well. He approached the steam drill much as another man might have approached a painting or a statue.

The rock drill sat unpacked from its crate on the back of the dray. The teamsters loafed nearby, smoking, but the drill was otherwise unattended. Ben looked it over. A Frenchman named Sommeiler had invented a compressed air rock drill in 1857, but this was the new Ingersoll drill and it incorporated many improvements.

It was a smooth cylinder of polished steel, just over three feet long with handles and also mountings for a tripod. A control lever was built into the grip. There was a socket on the working end. Different tools could be installed by unlocking the bottom casing, enabling the equipment to function as a hammer, a pick, a breaker, or even a shovel. He peered up the hole trying for a glimpse of the piston.

"*Bang!*"

Ben jumped and turned around. A young man in bow tie, high starched collar, and rolled up shirt-sleeves stood by laughing with his arms across his chest. Ben scowled at him.

"Funny," he said.

"You should have seen yourself jump," the man replied. "You must have gone a foot off the ground. You shouldn't poke your nose into things you don't understand. You might get yourself hurt."

Might get himself hurt? Wasn't that a hell of a thing to say to a man who'd spent the last several hours driving steel in a tunnel? "You must be the engineer," Ben said.

"I like to think so."

Ben waited for an introduction, realized he wasn't going to get one, and stuck out his hand. "Ben Judge," he said.

The engineer hesitated, then took his hand briefly. "William MacDonald," the engineer admitted, as though revealing his name would give Ben some mystic power over him. Many engineers were sensitive about their social status. Professionals, like lawyers or doctors, tended to look down on them because they worked with their hands. They regarded engineering as a trade, not a profession; and its pursuit was "work" rather than "a practice." As a result, some engineers went out of their way to emphasize the gulf between themselves and common laborers. The ambiguity could be summed up in MacDonald's clothing: a dress shirt, but with the sleeves rolled up.

Ben turned back to the drill and resumed his inspection. "This thing works on compressed air, doesn't it?" He pointed to the handle. "That looks like a coupling for an air hose."

MacDonald raised his eyebrows and unfolded his arms. "Why, yes. My men are setting up the steam boiler and compressor over there by the tunnel mouth."

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Ben grunted and ran his fingers over the fittings. "How do you get the reciprocating action? Butterfly valve?"

MacDonald squinted at him. "Convex diaphragm valve," he said. "It flips-flops so that the air alternates between driving the piston up and driving it down." He frowned. "Are you an engineer? Why are you dressed like that?"

Because I don't have anything to prove, he thought. Aloud, he said, "How does the air get down below the piston to drive it up? There must be a bleed off somewhere."

"There is. You've got two cylinders there, one inside the other. When you pull the lever . . . here let me show you." MacDonald gripped the handle and squeezed. Ben smiled. Blood will tell, folks said. Scratch any engineer, even the ones with university education, and you'd find a man who loved to make things work. For all of his snootiness, MacDonald was Ben's soul-brother.

"That lets the air through the diaphragm valve," MacDonald told him, tracing the path with his finger, "so it goes into the compartment between the outer and inner cylinders."

"Then the bleed-off valve must be near the bottom, below the piston's rest position."

"Right. The air goes down the outside cylinder and up the inside cylinder. That forces the piston back."

"Which compresses the air above it and flips the diaphragm valve. That's why it's convex." Ben could picture the innards now in his mind. It was pretty, the way it used the upstroke to trigger the downstroke.

"Yes, now the compressed air goes directly into the inner cylinder and drives the piston down. . . ."

"How hard?"

"About two hundred foot-pounds."

"Is that so?" Ben was surprised. "There's a man in the hole there," he said, nodding his head, "who swings 2,200."

MacDonald shrugged. "I don't doubt you; but my machine runs more strokes per minute and it doesn't tire."

Neither does John Henry, Ben thought; but he knew MacDonald's point was valid. Besides, not everyone was a John Henry. And the machine would save hundreds of men from back-breaking, man-killing labor. "These holes on the side," he said. "They vent the air from the inner compartment. . . ."

"Once the piston is down the full stroke."

". . . which relieves the pressure and flips the valve back so the air from the outer compartment can start the next cycle. Beautiful!" He admired the elegance and simplicity of the solution. A lovely job of engineering. He wondered how long it would be before the Colt and Winchester people adopted the principle. They should be able to build rifles and pistols that would eject their spent cartridges automatically and recock themselves for nearly continuous fire. Like a Gatling gun, but with only a single barrel. There were other applications beyond rock drilling, some of them less obvious than "automatic" pistols. He made a mental note to tell the Associates about them. After all, it was for such insights that these field trips were needed. There was a limit to what the Council could deduce from their equations and abstractions.

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He and MacDonald discussed the tolerances and specifications. Ben suggested modifications to two manufacturing operations to improve the process capability and thereby tighten the tolerance. MacDonald was impressed, but tried not to show it. He still wasn't sure just who or what Ben was.

"Judge! Quit yer jawboning and haul yer lazy carcass back in here! I'm docking you an hour's pay!"

Ben saw his foreman by the tunnel mouth, hands on hips and legs akimbo. Ben was annoyed; not because his pay had been docked, but because his discussion with the engineer had been cut short. But there was no point in antagonizing the boss. He still needed to watch the machine in action, and being thrown off site would not help him any.

When the steam drill was installed, it seemed to Ben that the tunnel grew hotter, even though the boiler and compressor were located outside. There was no doubt that it grew noisier. The men had swung in rhythm while one of the workmen called out a chanty, and the steel had rung in a wild kind of music. Now the banging of the steam drill and the hiss of its vented exhaust air added a new, cacophonous voice to the din of the tunnel.

Some of the shakers quit rather than hold spikes for the thing. MacDonald had set it up on its tripod and it ran without anyone holding it. The shakers thought that unnatural. Ben watched the drill operate and made mental estimates of its performance and reliability, which he recorded later in a daybook he kept for that purpose. The system had no redundancy. If any part failed: valve, hose, piston, compressor, the whole thing would fail. That made reliabilities easy to calculate. Put two parts in series, each 99% reliable, and the product would be 98% reliable. The steam drill had many components, but some of their reliabilities he knew from other applications and others he could extrapolate from the known performance of similar items. So far, the drill was fulfilling its designer's every promise.

Henry drove side by side with the steam drill, his face as hard as the stone he hammered on. Gradually, Ben became aware that Henry was timing his swings against the machine. The drill made scores of strikes for every one of his, but his spike sank farther on each stroke. Only, when Henry took his rest breaks, the machine continued to bang away, which earned a scowl from the big man.

It was during one of these rest breaks that Ben heard someone yell, "Bad ground!"

It was as if a puppeteer had yanked on his strings. Everyone's head jerked up in unison to stare at the hanging wall. The rock there was groaning, all set to drop the lid. And then, even before the thought was fully formed, the men scrambled for the timbering, Ben and John Henry among them. John Henry was a big man, but the mountain was a whole lot bigger.

One man ran the other way, swimming his way through the crowd of workers. It was MacDonald. Ben tore at his sleeve. "Get back, you fool!"

"My drill!" he cried. He breasted forward and seized the machine and began dragging it back toward the timbering. Rocks fractured off the wall and

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bounced into the tunnel. One large one, three feet across, rolled and pinned a powderman against the shaft. The powderman saw it coming and screamed as the boulder smashed his hips and legs and genitals. Ben heard his bones grind and snap. Bright, copper-smelling blood gushed forth from the man's femoral artery.

Then the lid dropped with a roar. Ben covered his face with his arms against flying splinters. The sound seemed to go on forever.

When the dust cleared, the whole work area was a mass of rubble that they would have to dig out a second time. An arm jutted stiffly from the wreckage. The men leaned on their tools or sat on the floor and wept. Ben looked around and saw MacDonald, shivering with fear, holding his steam drill to himself like a mother clutching her child. Ben wiped his mouth with his sleeve and it came away bloody, where he had bitten away part of his lip. He decided then and there that he had enough performance data to complete his evaluation. It was time for him to leave Big Bend.

The railroad men shrugged it off. Death went with the job, and they buried the horror of it deep down where it would never bother them, except when they dreamed, which was not often, or when they drank, which was. When they sat around the campfires that night, it was the machine they discussed, not the cave-in.

Sparks, the powderman, leaned against the bole of a cottonwood and played random fragments of music on a mouth organ. Henry poked at the fire with a stick, sending showers of sparks upward. Ben crouched by himself, wrapped in his own thoughts.

George Johnston was the timekeeper. As such, he was a cut above the laborers in the complex social structure of the workingmen. He stood to the side, chewing tobacco. Now he spat a wad into the fire.

"I reckon that steam drill is the finest thing ever invented," he said. "It'll sink more steel faster than just about anyone."

"Just about anyone," said a deep voice.

Everyone looked at Henry in surprise. It was the first they had heard him express an opinion on the subject.

Johnston chuckled. "Maybe even more than you, John."

Henry threw his stick into the fire. The flames crackled and cast dancing shadows across his ebony face. He turned to Johnston. "Ain't no maybe about it," he said. "They ain't a machine anywheres can beat John Henry." The black man thrust his jaw out and dared Johnston to disagree.

The timekeeper shrugged his shoulders. "Sure, you're the best driver on the C&O, but that contraption'll outlast you, John. It just keeps going and going. Never gets tired."

Henry just grinned and shook his head. Sparks put down his harmonica. "I'm with Johnny," he declared firmly. "No machine can beat a man. It just ain't right."

"Right's got nothin' to do with it."

"And I've a hundred dollars says my machine can do it," said a new voice.

They turned and looked. It was MacDonald, the engineer. The com-

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pany foreman was with him, looking sullen and unhappy.

Sparks was offended. "You mean drive more steel than Johnny here? Man, yer daft." He blew a discordant riff on his mouth organ to underscore his point.

MacDonald scratched his cheek. "We *could* conduct an experiment," he said.

"Stage a contest?" Sparks's mouth split into a gap-toothed smile. "Sure! That'll settle things!" There was a chorus of agreement around the fire.

"Hold on a minute! Hold on," fumed the foreman. "We've got a tunnel to dig. We lost almost a week's work today because of the mishap. I won't delay the schedule any further just to play out some silly bet." He yanked the cigar from his mouth and waved it. "I don't know what all the bother is, anyway. We've driven steel by hand for a long time and still managed to dig tunnels."

Ben reflected that that was typical of engineers and operating men. The engineer saw the operation as a useful place to stage his tests; while the operating man saw the tests and design changes as bothersome delays. Yet, neither one could function without the other.

"Don't worry about it, Mr. Henderson," MacDonald said. "I'll telegraph Ingersoll and they'll arrange it with the C&O people. I'm sure they'll be glad to cooperate."

The foreman chewed on his cigar, scowling; but the invocation of top management had effectively undermined his objections. He shoved the cigar back between his lips and looked at his top driver. "You willin'?" he asked.

"I gets the hundred dollars?" Henry answered. The big man's coyness didn't fool Ben. He knew the other was itching to take on the machine.

The foreman laughed. "Every penny."

"If he beats the drill," said Johnston, "he deserves it."

"Polly Ann could sure use a few things around the house," mused Henry, looking at the sky. "She's been wantin' curtains for a 'coon's age now. And I sure would like to see her in that new hat we saw in the millinery store." Polly Ann was Henry's wife. She lived in their house in Hinton, about five miles away. During the week, Henry stayed in the camp rather than race the time-clock back and forth, but he usually made it home every Sunday.

"Don't spend the money yet," MacDonald reminded him. "First you have to beat my drill."

Henry looked at him. "Mister, a man ain't nothing but a *man!* I'll beat it."

During his week at the tunnel, Ben had, somewhat to his own surprise, managed to win himself a place as the number three steel driver. He now shared a tent with Henry and another man, named Hardy, who was number two. Hardy kept a razor in his boot and was known as a man not to be crossed; but he had run off following a brawl in which he had killed a man. The laws were out a-hunting him and, one way or another, it was unlikely that he would return anytime soon. So Ben and John Henry had the tent to themselves.

The night before the contest, Henry lay on his cot with his arms crossed behind his head, staring at nothing in particular. Two new twenty-pound hammers stood next to the cot. Henry

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had asked the captain to buy them for him and the captain had agreed. He had spent several days tallowing the handles until they were limber enough to satisfy him. When he felt he was ready, he told the captain and the arrangements for the contest were made. The district manager for the C&O had come to watch, along with a sizeable contingent from the crew digging the approaching bore.

"Are you ready for tomorrow, John?" Ben asked him.

"Tomorrow be just another day, King Arthur. Drivin' steel, like always."

"The machine doesn't worry you?"

"The machine." Henry's voice was full of contempt.

Ben was lying in his own cot, reading a book by kerosene light. Seutonius's *Lives of the Twelve Caesars*. He read every night before falling asleep. Henry had watched him the first night they had shared the tent, a little bit amused, and perhaps a little bit wistful. Now, Ben closed the book and looked at his bunkmate. Henry, by his words and attitude, had made clear what he thought of John Henry; but he had never, so far as Ben could tell, revealed what he thought of the steam drill itself.

"It's the future," Ben said.

"No, it ain't."

Yes it is, thought Ben. *I've seen the equations. The machine age is coming and there's no way to stop it: and I wouldn't stop it, even if I knew how.* "John," he said aloud. "How many men have died to dig this tunnel?"

Henry eyed him. "That cave-in still botherin' you? Hell, man! Happens all the time, it does. Man can't be lettin' that worry him none."

"How many?" Ben insisted.

Henry shrugged. "I don't know. Eighty, maybe a hundred."

"So far. And the tunnel's not finished yet. Do you know what happened at the Hoosac tunnel in Massachusetts? One hundred and thirty-six men were killed digging it. And that wasn't nearly the job this one is. Just a cut, not even a bore. In the short while I've been here, I've seen men die from cave-ins, from explosions, from heat stroke! I've seen them blinded and deafened and God alone knows what the rock dust is doing to our lungs! I've seen hands smashed by hammers and legs cut off by runaway rock carts! John, when the lid drops, isn't it better if a steam drill is under it instead of a man?"

Henry smiled. "When the lid was ready to drop, your friend MacDonald ran back under it to rescue that drill o' his."

"MacDonald was foolish."

"Brave, too."

"He was frightened out of his wits. I saw him."

"And he be runnin' back anyways. An' that's what bravery is. Doin' what you needs to be doin' even when you knows it can kill you."

"That drill will save hundreds of lives," Ben insisted. "People won't have to die in the heat and dust and noise, beating hammers against rocks just to earn a few dollars."

"An' how will they earn a few dollars? What I be doin' when your steam drills be doin' my work? Tell me that, Mister Book-reader. It's when I'm a-drivin' that steel that I'm *alive!*" He struck his chest with his fist and it resounded like a drum. "*Inu mi yio dun!*"

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he said in a sing-song voice, almost like Chinese. "You be strong, King Arthur; but I could lift you and break you in two if I'd a mind to." He laughed. "I gets my strength from Africa. I was born in Tennessee, but my pappy, he come right from there. One of the last they ever took out. He called hisself a Yoruba man from Day-homey, and his king sold him to the white man."

"You're a smart man, John Henry," Ben told him. "You can learn a new job. You could go to school."

Henry laughed. "And be a lawyer or a doctor?"

"Or an engineer or an accountant or anything you want to be. I've seen you. I've watched you. You soak up new words and new ideas like a sponge soaks up water. You could be good at whatever you set your mind to."

"Would I be the best?"

"What?"

"If'n I was to be an enjy-neer, like you says, would I be the best there ever was?"

"Well, no . . ."

"Well, then."

"That can't be all there is to it!"

"Can't it?" Henry raised himself on one elbow and looked at Ben across the tent. "I be the best steel drivin' man on the whole C&O road, maybe in the whole world. Maybe the best there ever was. *Me!* John Henry. A slave and the son of a slave."

"It'll kill you some day."

"That it will. But you ask Sparks, the powderman. Ask him about that Irish hero of his'n, that Cuchullain fella. He done tol' me all 'bout him. Seems they asked him when he was born would he like a long quiet life and be forgotten or a short glorious one and be remembered. And he took the choice any real man would. Now you tell me, what I can do that I be the best in the world."

Ben had no answer for him. Henry lay back down again and resumed his contemplation of the tent-top. *I should have left,* Ben told himself angrily. *I should have left right after the cave-in, like I wanted to. There was no need for me to stay and watch this contest. It won't affect my data any.*

On the day of the contest the sun beat down on their heads. The workmen accosted one another, placing bets. Coins clinked in palms. Men licked the ends of broken pencils to sign chits against their next play. The smart ones were quoting even odds. The important visitors were set up in a tent outside the tunnel, where they could await the results in comfort. The foreman had wanted to hold the contest outside, where everyone could watch; but Henry insisted on holding it in the tunnel and MacDonald had agreed. "The test should be conducted under realistic conditions," he had said.

Inside the tunnel, the men formed a wide circle around the tunnelhead. It was hot, like always, and they mopped their necks and faces with their kerchiefs. They talked and laughed excitedly. The ones in front knelt or sat so those behind them could see more clearly. Ben took a place up front, sparing a nervous eye to the fractured ceiling.

MacDonald had set up his drill on the left while Henry waited patiently on the right. Henry struck a relaxed, almost arrogant pose, his left hand balled on

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his waist and his right holding the new 20-pound hammer slung over his shoulder. He whispered something to his shaker and the man shrugged and nodded. Henry pointed at Ben.

"I wants King Arthur there to hold my steel."

Ben blinked, surprised. The men on either side of him laughed and lifted him forward. He stumbled into the arena. Henry's shaker handed him the tongs. Ben took them and looked at Henry. The big man's face was impassive. Ben stuck out his hand. Henry switched grips on his hammer and took it. There were no tests of strength. Each knew and respected the other. Ben was surprised how much Henry's respect and trust meant to him.

"Good luck," he said.

Henry spat towards the corner. "Hell, King Arthur," he said. "Luck's got nothin' to do with it." Ben knelt by the spike, and gripped it with the tongs. He nodded to show he was ready.

Several holes had already been started in preparation for the contest. Henry spat on his hands, hefted his hammer and looked to MacDonald. The engineer saluted him and grabbed the trigger to the steam drill.

The timekeeper stepped forward. "You both understand the rules," said Johnston. "Drill for 35 minutes and we'll measure who sank the deepest. Understand?" He received two nods. He set his jaw and pulled his watch out of his pocket. "You will begin when I drop my hand," he said.

They waited, and the few seconds seemed agonizingly long. When the timekeeper dropped his hand, the sudden onslaught of sound was jarring. The steam drill started in like a woodpecker, rat-a-tat! Henry swung, slow and easy, like he always did, forming a bass counterpoint.

Ben tried to watch everything. Henry swinging with grim intentness. MacDonald, with his arms folded after starting his machine, standing along the sidelines. The other shaker watching bug-eyed as the steam drill jiggled and hammered.

They went on that way for about fifteen minutes. The rhythym almost hypnotic in its effect. Then, suddenly, Henry stopped. Ben looked up in surprise. The man couldn't be quitting this soon!

But Henry had taken up the second 20-pound hammer in his left hand. He gestured with his boot to a second spike. Ben looked to the spike and back, then gripped the second tongs. He choked high on both tongs, so he could wrap his hands around the two handles, and squeezed with all his might. That put him effectively within the arc of both hammers. He didn't let that bother him.

When the crowd saw what Henry was doing, they let out a great shout that drowned, for a moment, the monotonous rattle of the steam drill. MacDonald's jaw dropped and he unfolded his arms.

Henry swung windmill fashion, one hammer in each hand, striking each spike alternately. The other rail road men were going crazy. They were shouting and slapping each other on the backs.

Then the timekeeper blew the whistle. Henry checked himself in midswing. MacDonald was caught off-guard and was a moment slow in shutting off

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his drill. The men booed him, and he had the grace to blush.

Sparks brought out his measuring stick and stuck it down the hole that the steam drill had made. He marked the place with his thumb, pulled it out and squinted at the numbers scratched on it. "Nine feet," he announced.

Then he came to Henry's holes. "Seven feet," he said after measuring the first. Then the second, which Henry had drilled left-handed. He pulled out the stick and whistled. "Wisha! Another seven feet!" He looked at the steel driver in awe. "Left handed."

"I likes my holes to be even," Henry told him.

"That makes fourteen feet combined," Sparks announced. "Johnny wins the first round!" The men roared their approval, clapping and hooting. Ben saw money changing hands. Henderson, the foreman, smiled grimly and gave the engineer an I-told-you-so look.

"The second round is an endurance contest," Johnston announced. "Each contestant will drill as many five-foot holes as he can before quittin'. If the machine jams or breaks down, that counts as quittin'." He looked back and forth. "Any questions?"

Henry handed the canteen from which he had been drinking back to his shaker. He wiped an arm across his face and shook his head. MacDonald signalled that he was ready also.

Henry hefted his hammer in both hands and pointed to the row of spikes that had been set up. "We'll just sink them from left to right."

Ben nodded and took his position. Johnston blew his whistle and the hammering began.

* * *

It continued all day. John Henry hammered on the mountain like it was the dragon and he was St. George. Spike after spike sank into the granite. When the noon whistle blew he didn't pause. Ben saw MacDonald unwrap a sandwich for lunch, but Henderson stopped him and shook his head as if at a naughty child. *That's right,* Ben thought. *If John can't take a break, neither can he.*

Henry's torso glistened with sweat and his breath came in heaving gasps, but he never missed a swing nor turned a stroke. His eyes stared at the spikes in rapt concentration, his whole world narrowed down to a few inches of steel. Swing. Strike. Recover. Swing. Strike. Recover.

Then, about four in the afternoon, he faltered. Ben looked up at the sudden change in rhythm. Henry stood with his hammer half raised, a look of intense puzzlement across his face. "Ben?" he said questioningly. Then he collapsed, like a rag doll from which all the sawdust had drained.

Ben dropped the tongs and jumped to his side. He grabbed the black man's shoulders. "John? John!" The others in the tunnel were standing up, pushing closer. MacDonald had stopped his steam drill and was staring with a white, pale face. There was a deathly silence in the tunnel, the first time Ben had ever heard it quiet. A man shoved his way through the press toward where Henry lay.

A smile stretched itself across Henry's face. His right arm twitched and the hammer slid across the floor to touch the spike. There was a faint metallic

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ping, and everyone who heard it flinched as if it had struck them.

The eyes rotated until they focused on Ben. "Ben," the man whispered. "I beat it, didn't I? I beat that damned machine. I'm the best there ever was."

"You sure did, John. Fair and square. The best there'll ever be."

"*Inu mi yio dun*. My heart is glad." Then he laid down his hammer and he died. Ben squatted next to him, his hands clenched into fists, holding back his tears. He tried to think about all the lives the steam drill would someday save. It was no comfort. Sometimes even a fact is no comfort.

A man in frock coat and top hat had squatted down across the body from him. He had a black bag which he set down and opened. Ben recognized him as a doctor from Baltimore who had been passing through the county and had stayed for the contest. He checked for breath and pulse. His mouth twitched. "I'm afraid he's gone," he said.

Four men came and picked up the body. They carried it away. The crowd in the tunnel began to break up, murmuring in whispers about what they had seen. MacDonald reached out to begin disassembling his equipment, but jerked his hand back from it as if he had been burned.

Ben's eyes burned. He took hold of Henry's hammer. The handle was smooth from the tallow; the head still warm from the kinetic energy. He ran his hands up and down the handle.

Then he stood and, before he even knew what he was doing, he began driving on Henry's stake. The steel rang and Ben heard gasps from the tunnel, and running feet. Then there was nothing but the hammer, and the steel. He swung with all his might, feeling the spike sink into the rock like it was butter. He recovered and struck again. And again. And again.

The tears came now, blending in with the sweat that poured off his brow. The tunnel rang with the echoes of his strokes and Henry's laughing bass was mixed in with them somehow. He breathed in sobs, in time to his hammer. The feeling of indescribable power was on him as the mountain gave way to his will. He was exalted and grinned in a fearsome rictus.

Then strong hands took hold of him, and the hammer was taken from his grasp, and he was half-carried, half-led, still weeping, up the tunnel toward the day. ■

● Though many have tried, no one has ever yet explained away the decisive fact that science, which can do so much, cannot decide what it ought to do.

Joseph Wood Krutch

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the reference library

By Tom Easton

Not for Glory, Joel Rosenberg, NAL, $? (hb), ? pp.

Station Gehenna, Andrew Weiner, Congdon & Weed, $15.95, 224 pp.

Shadow, Dave Duncan, Ballantine/Del Rey, $2.95, 288 pp.

The Reluctant Swordsman, Dave Duncan, Ballantine/Del Rey, $3.50, 336 pp.

After Long Silence, Sheri S. Tepper, Bantam, $3.95, 352 pp.

The Dark Side, Zach Hughes, Signet/NAL, $2.95, 208 pp.

Mercedes Nights, Michael D. Weaver, St. Martin's, $16.95, 272 pp.

Bright and Shining Tiger, Claudia J. Edwards, Popular Library (Warner), $2.95, 218 pp.

Joel Rosenberg knows how to handle mayhem. In fact, he can—and does—decorate the scenery at times with enough blood and guts to satisfy a fan of slasher flicks. But that, as seems not to be the case with certain other writers (and even publishers), who claim that arterial crimson is the color of honor, is not Rosenberg's point. He makes this clear in his latest novel, **Not for Glory.** The book is a well crafted reminder of war's one true purpose and a welcome rejoinder to the pornography of violence now flooding not just SF, but also other genres of popular literature.

What Rosenberg gives us is Metzada (a word perhaps more familiar as "Massada"), a world of Jewish Dorsai that immediately makes us think of the 1967 war and Entebbe and . . . , of military competence and of heroism as the order of the day. But Metzada is a less fertile place than Israel, a rock as barren as its namesake. Its inhabitants live in warrens burrowed beneath its surface and subsist almost entirely on imports. It pays for those imports with the money earned by its mercenaries. And the lives

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of each of its people answer the question: Why war?

We see this answer clearly in the story's central characters. Tetsuo is an Inspector-General and an assassin told to finish off the exiled Shimon Bar-El, a one-time general who may or may not have taken a bribe. But Shimon is also the greatest of strategists, and before Tetsuo can assassinate him, he must enlist his aid so that Metzadan forces may win another battle.

Shimon knows what Tetsuo's assignment is. He knows how the system works, after all. But he lets himself be talked into helping, and he comes up with a lovely wrinkle to replace low-tech besiegery, and to minimize the bloodshed. And when Tetsuo lets him walk away, alive, he does not seem surprised.

Perhaps he knows that Metzada will need him again, as it does. This time, however, Tetsuo cannot simply talk him into helping. First, he must rescue the older man from a youth gang he was "advising." Tetsuo has the aid of a handful of retired soldiers, who retain sufficient competence to turn the gang into wall-decorating smears. Once rescued, Shimon helps again, of course, once more coming up with a relatively nonviolent solution to the need to neutralize an enemy. And once more Tetsuo refrains from killing him.

This time, however, Rosenberg clearly lays out the reason for sparing Shimon Bar-El. Shimon and Tetsuo have a common test for the rightness of an action—Is it good for Israel?—which, though it may seem pridefully ethnocentric to others, guides them well enough. Tetsuo cannot kill Shimon because he is too valuable to Israel, exiled or not.

What is the one true purpose of war? I could let Rosenberg tell you, but I won't. To Israel, "Is it good for Israel?" means "Does it aid Israel's survival?" And I find it very easy to agree that war in the interest of survival is justified. War in the interest of greed, or aggrandizement—call it glory, or honor—is not. On the other hand, many people value wealth and glory more highly than do I, or Joel Rosenberg. To them, war is "good for Israel" when it pursues such values. Survival is irrelevant, for if one does not live to enjoy one's booty, one can still go out in the proverbial blaze of glory. John W. Campbell, Jr., would have called such people barbarians, like the Vikings. Those who war for higher things —survival, freedom, peace—are civilized.

Do all Metzadans see things this way? Those military retirees, low-rank soldiers all, that Tetsuo enlists to fight the youth gang certainly do not. Their value is the honor, the glory, the satisfaction, of a job well done. They are not bloodthirsty, but neither are they much concerned with the higher goals of civilization. Retirement drives them mad with uselessness, and the promise of a death in action is enough to gain their aid. They are competent killers, and they enjoy their work, but they are like factory workers or musicians—they live to exercise definite skills. They are as barbaric, in their way, as Vikings.

Perhaps Rosenberg is saying that the common man who gets off on mayhem is also a barbarian. It takes membership in some elite of moral sensibility to see that death is less than glorious and that blood, however pretty it may be upon the walls, is no excuse for war. And yes, he says, soldiers and assassins *can* belong to this elite. They qualify when they seek victories which, though bloodless, still aid survival.

Andrew Weiner's **Station Gehenna**

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is one of the first in the "Isaac Asimov Presents . . . " series from Congdon & Weed in association with Davis Publications. It belongs in the series, too, for it steps into territory—the SF mystery—dominated by the Master and handles itself reasonably well. Unfortunately, Weiner chose to use a stuffily formal style reminiscent of the stuffiest of British mysteries; the result, for me, was constant irritation and considerably diminished enjoyment.

Gehenna is a world of toxic atmosphere, high temperatures, white moss, and mist. There is mineral wealth too, and if that is not enough to explain why the R.G. Spooner world development enterprise is cooling, oxygenating, and otherwise terraforming Gehenna, well, the real mystery is something else. One of the terraforming crew took a walk outside the station, in the nude, and died. Suicide is the verdict, and the corporation dispatches psychologist Victor Lewin, disguised as a replacement leisure specialist, to evaluate morale.

Soon Lewin begins to receive hints that the "suicide" might have had a malicious component. There are safeguards to keep anyone not properly protected from leaving the station, after all, and there are ominous patterns in the crew's emotional weather. But then he sees gigantic ghosts in the mists outside, he dreams, another dies, and he begins to suspect that Gehenna has alien natives who do not want their home changed to suit human needs. He even learns that R. G. Spooner himself is determined to subdue Gehenna, which he discovered forty years before and on which he lost an arm.

Weiner sprinkles clues in every possible direction before finally bringing Spooner back to Gehenna to catalyze the denouement. And if it wouldn't be fair to say what truths that denouement makes plain—were the deaths murder, suicide, or accident? If murder, who is the murderer? Are the aliens real, or delusion?—I can still say that no matter what your guess, Weiner will have a surprise for you.

Sadly, this means Weiner's tale fails as a real mystery, of the sort whose readers can gather clues and anticipate the solution. He explores only one psychology in depth, and that is the psychologist's, not that of any potential killer. He holds back too much essential information until he can reveal all at the end, showing himself to be the sort of mystery writer more interested in showing off his own cleverness—or perhaps too unsure of his ability to misdirect his readers from the clues that matter—than in creating solvable puzzles.

After thirty years of petroleum geology, Dave Duncan switched careers: He became a SF&F novelist. And it is my pleasure to tell you that he is worth watching. I have here his two latest efforts, and they show an admirable progression in authorial confidence, storytelling deftness, and writerly skills.

The first is **Shadow,** the tale of a distant world settled millennia ago by humans. The world is much like Earth in that it has oceanic basins, continents, continental shelves, volcanoes, and so on. But it has little water, and it keeps one face to its sun at all times. Only the twilight zone is habitable, and only that portion of this zone that intersects the continental shelves. The continents are too high and the air too thin and cold for humans to breathe. The basins are too deep, the air too dense and hot. And the extreme differences in elevation and illumination lead to some interesting wind patterns, of which this world's giant eagle-like natives take full advan-

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tage. So do the humans, for they have tamed the eagles to their riding.

Duncan thus has a lovely stage for his tale of medievaloid intrigue. Human society is dominated by a King who must always have the Shadow King behind him. The job of the Shadow King, and of the Shadow Prince who tails the heir apparent, is to detect, decoy, or otherwise deflect assassination attempts. Now Duncan gives us a scion of the lower nobility, little better than a commoner, who is elevated to the position of Shadow Prince. The Prince then takes off on an exploration of the hinterlands, where he discovers a *doppelganger* or two and a hint that he may not be his father's son. Meanwhile, back at the palace, the nasty younger prince is scheming, and when accident befalls the Prince despite all his Shadow can do, the younger stabs his father and seizes the throne.

Shadow soon learns that his Prince lives and that the eagles are more intelligent than all but a few dusty rebels have suspected. Rebellion is necessary, and soon a little insight makes it easy, though that same insight will change the world of Princes and Shadows more than anyone can suspect.

Does it sound like a fairly standard story? Plot and counterplot, the villain trumped, and virtue triumphant? So it is, until Duncan takes the next step: The Prince is a product of his culture, and for all his position on the side of Right, fairness is just not in his nature. And the author has an unusual sense of just how fundamental change can be.

We see the hand of one who knows his geology once more in **The Reluctant Swordsman,** the first volume of a trilogy that flows from the simple fact of the late Wallie Smith awakening in a mightily thewed body on another world. That world is one of gorges and cataracts and rivers, and it is ruled by a goddess who has a task for a suitable hero.

Her first choice failed. So she brained the sucker and plugged Wally into his skull. Now he is Shonsu, a swordsman of the seventh rank, awakening in the goddess' central city, where corrupt swordsmen keep the peace. And he doesn't believe his eyes. He, Wallie, is a nice guy, he is, and he knows a hallucination when he sees one. He *won't* play.

So the gods must wise him up. They get him into jail. Their emissary tips him to how he just might be able to survive the judgment ahead, presents him with a sword of legend, and gives him his mission in the form of a cryptic verse. The rest of the book deals with his coming to terms with his new life, his defeat of corruption, his gaining of sidekicks, and his embarkation on his mission. I won't detail it. I will say that here Duncan demonstrates a remarkable smoothness and deftness that may well, in a few more years, make him one of our premier writers.

He's worth watching for the worlds he builds, too, though he has a tendency to model his societies on fairly standard predecessors. *Shadow* world is stock king-and-court stuff. That of *Swordsman* has elements of various Asian religions, and the characters have names that sound so Japanese that we are not surprised to meet the swordsmen, so much like samurai. In both cases, however, Duncan marries his societies to their worlds in ways that give his stories more originality than one might suspect.

Sheri Tepper has been making quite a splash since her retirement from Planned Parenthood in Colorado. Book after book, every one of them readable,

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many of them on the better side of good, and now Bantam gives us her **After Long Silence,** complete with an embossed cover, sure mark of a publisher's hopes of bestsellerdom.

I've seen worse bestsellers, and so have you. Tepper has a sure hand with romance and self-discovery. She also has the gift of detail, so that she imbues with grand immediacy her world of Jubal and its mountain-sized, crystalline Presences which, unless mollified by the songs of Tripsingers, kill any human so unlucky as to tread or operate machinery too close to their sacred precincts. Clearly, Jubal owes something to the world Anne McCaffrey created for *Crystal Singer* and *Killashandra*, though Tepper does take the crystals a step further: When she mentions an eccentric researcher into the question of whether Tripsongs are actually a language, the experienced SF reader promptly suspects that the Presences are both alive and intelligent. And when we learn that Jubal's corporate rulers are plotting to rig an official inquiry into the question of indigenous intelligence and then to destroy the Presences as obstacles to civilization, the end becomes inevitable. All else is detail, though that detail has the Tepper touch.

The tale begins when Tasmin Ferrence, master Tripsinger in the district of Deepsoil Five, is visited by his long-estranged brother, Lim, who has turned the music of Tripsinging to commercial advantage. Lim wants the Enigma score, just transcribed by Tasmin from the work of Don Furz as a Tripsong that might quiet the Enigma, a Presence that so far rejects all approaches. Tasmin refuses. Lim prevails upon Tasmin's wife to snaffle the score behind his brother's back, the two go to try it on the Enigma, and both die. Tasmin, mad with grief, leaves home with two acolytes to seek a reason for the loss of his wife. (One of these acolytes is a young woman who loves him. Do you recognize the setup?)

Tasmin's journey brings him to Don Furz and the great secret behind the Enigma score, while Tepper adds to the tale episodes to illustrate the corruption and evil at the heart of Jubal's various leaderships. Once Tasmin is in motion, she can reveal the secrets at the heart of reality, and the tale soon gains a juggernaut momentum that kept me reading till well past my normal bedtime, even though I did have to suppress the niggling thoughts that the ending was much too pat, that humans were atypically considerate in saving the dynamite for this late date in Jubal's history, and that Jubal's people could have saved themselves a lot of trouble if they had looked up hang gliders and parachutes in their encyclopedias.

In **The Dark Side,** Zach Hughes goes in search of the nature of human evil, of the dark side of human nature, and finds it in something as simple as selfishness. Do you say there is nothing profound there? Maybe so, but I found it refreshing after reading too many efforts to externalize evil in dark powers and totalitarian ideologies.

Hughes begins with an interstellar freighter loaded with highly perishable and valuable cargo. It receives an emergency message ordering it to divert to a world in trouble, there to help evacuate the citizenry. The captain, knowing that obeying will mean the cargo must spoil and ruin him, conceals and ignores the message. However, third mate Aaron Delton catches on and invokes space law to overrule the captain. But by then it is too late. Delton's wife and child, at home on that world of disaster, are dead, partly because a mercenary leader

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seized the evacuation ships for his forces and fired on the panicked citizenry.

Delton vows revenge, but first he must acquire wealth and a ship. Under a new name, he shows up on the frontier, where he signs on to captain a salvage tug. His sole crew is a standoffish woman who later proves to share significant elements of history with him. They ally, and when they later pursue their joint vengeance they find that even heroes can kill unarmed women and children.

That's right. Hughes's hero is not one of those chumps who lays down his gun when the villain threatens an innocent. Hughes has a realistic eye. Sadly, his vision is marred by a sentimental tear: He should have stopped the tale two pages sooner.

Mercedes Night is an actress in the world of the twenty-first century. The U.S. has gone autocratic, complete with a "National Police" force, and history is shamed by a recent period when moralistic reactionaries trashed much of twentieth century culture, including such great universities as Harvard.

Mercedes is also the centerpiece of Michael D. Weaver's first novel, **Mercedes Nights.** The gimmick is that secret forces have cloned Mercedes and advertised her for sale, at a high price, to whomever might like her as a sex-slave (kept amenable by hypnotic drugs). The NP know what is going on, but even though it is illegal as can be, they are letting the operation run: They have plans for a clone of the woman who is also the secret lover of the Administration's greatest threat, Warren Keyes, the New Socialist presidential candidate.

In due time, once Weaver has painted in the outlines of a world of official corruption and widespread poverty and technical marvels, he lets the original Mercedes twig to what is happening in her name. There ensues a flurry of disasters, including Mercedes's own execution for murder, but then Mercedes contacts an old friend who works for a corporation that is sending ships and colonists to the stars, and suddenly we see how the plotters' schemes are about to rebound as a delightfully potent monkey wrench.

The tale is well told, amazingly so for a first novel, and the end delights by the way it hints at great satisfactions to come. I'm going to be watching for the Weaver name in the future. You should too.

Claudia Edwards has written two previous novels, *Taming the Forest King* and *A Horsewoman in Godsland,* neither of which I read. Her third, **Bright and Shining Tiger,** has the feel of a sequel, for there are constant allusions to events that fit at least the *Godsland* title, but nowhere does the package I saw make the link explicit. It may not matter. Though Edwards has a nice sense of the plight of a woman confronted with an astonishing reality, her writerly skills need some development before she is worth raving over: She is prone to afterthoughts of the "Oh, yeah, he had wings!" variety; inconsistencies in the powers and limitations she grants her characters; and pollyannaish views of gentle cultures.

The story: Runa arrives, with horses, in a lush land whose farmhouses are occupied by skeletons and whose people, the "tillers," complain of a long-past rebellion against the mantic (witch) and margrave (warrior) of the local castellum that cost them health and protection. They are now subject to disease and banditry, and they seize upon Runa who, because she rides a horse, is obviously a mantic. Worse yet, the re-

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gion's tutelary spirit, the Silvercat, agrees in the choice.

As soon as Runa has settled into the castellum, a barbarian warrior knocks on the gate. He thinks it a fine idea to marry Runa and become the new margrave, and in the former notion—despite the presence of plenty of physical conflict—we find what drives the plot. Runa admits the need for a margrave, for the tillers need protection. She admits the need, according to the customs of the land, for a marriage of mantic and margrave. But consummate that marriage? Join her innocent and blushing bod with that of this bellowing, bearded barbarian? Like hell! When he makes his first conjugal move, she nearly pulverizes him with a blast of magic.

Thereafter . . . He proves a gentle fellow, really. He shaves. He dresses up in civilized finery. He modulates his voice. And she sees his charms just in time, for before the final clinch and fade, they must be fully allies.

ANADEMS

The question is: Do you need it? F. David Peat's **Artificial Intelligence: How Machines Think,** first published in 1985 by Baen Books, now has a second edition, updating its lucid account of the field. The answer is: If you have the first edition and have kept up with *Scientific American* or the computer press, probably not. If you don't and/or haven't, and if you are interested in what lies just around the temporal corner, then yes, rush right out and grab a copy. the first edition was a trade paperback at $8.95; expect the same package and a similar price ($9.95?) for this one.

Some of you will welcome Laurence M. Janifer's **Knave and the Game** (Doubleday, $12.95, 176 pp.). It collects nine tales of Gerald Knave, Survivor, five of which appeared first in this magazine. If you enjoyed them, you will want the other four, one of which seems to be new (by which I mean there is no mention of prior publication, but what does that tell you? The jacket copy says the book contains only seven stories!).

Ben Bova's **The Kinsman Saga** (TOR, $17.95, 576 pp.), says the author in his introduction, returns him to where he started: to the character who has long obsessed him, to Chester Kinsman, hero, symbol, Christ figure, to an answer to our Cold War follies. Here, he says, his two Kinsman novels, *Millennium* and *Kinsman*, and a number of Kinsman short stories, "have been reexamined, rethought, and rewritten. All the characters and themes now mesh properly, and you can read the story of Kinsman's life from beginning to end as a single seamless garment."

He's right. *The Kinsman Saga* is indeed a single tale knitted of others, and it speaks, as Ben wishes, to an age when space and martial sanity seem in doubt. If you haven't read the earlier works, grab this one. If you have, do the same, for now he tells his story with more skill and care and unity. You won't regret the purchase. ■

●Let your soul stand cool and composed before a million universes.

Walt Whitman

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EDITORIAL

(continued from page 10)

is not, as commonly stated, two offspring per couple. That would be true if all people formed couples *and* if the life expectancy never changed. The former is fairly close to true; in the world at large, most people do marry. The latter is *far* from true. In this country, for example, we have come to take for granted a life expectancy in excess of 70 years. At the beginning of *this century* it was only about 50. The medical advances of just a few decades have increased the life expectancy by more than 40%. The population will grow inexorably if the two children born to "replace" their parents live longer than they did, so there is more and more overlap of generations. The more the life expectancy grows, the faster the population grows—or, alternatively, the more the birth rate must drop to offset it. These effects accumulate *rapidly*. Life expectancy is still rising as medicine continues to progress along lines already established. Cell repair machines represent a brand new line. If they come into widespread use—and they, unlike cryonics, have a reasonable chance of becoming so cheap to produce that virtually anybody could have them—life expectancy would rise so drastically that the birth rate would have to drop to near zero to maintain anything like a stable population.

What do we do then? Many of us would like lives as long as possible, but do we want them at the cost of living elbow to elbow, or giving up the freshness we now get from a steady influx of brand new lives and viewpoints? Is there a way to get some of both kinds of benefits? Maybe, but compromise will surely be involved. There is reason to suspect that nanotechnology will also make moving into space much easier, but that still seems unlikely to provide significant relief for population pressures. Human populations will still tend to grow *from within*, wherever they are—and if individuals are both reproducing and living much longer, populations will grow faster than they have ever grown before.

When that point is reached, our descendants—and possibly even some of *us*—will have to make decisions not only about how many children to have, but how long to live. For the moment, we only have one of those choices—but that one demands plenty of attention, right away. If the problem continues to be largely ignored while it is still relatively simple, we are going to be utterly unprepared to deal with the complications to come. So it is essential that people figure out *now* what sort of population they want, and what they are willing to do to get it—not by reacting to how they *feel* about one small aspect of the problem, but by *thinking* about *all* aspects of it. ■

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brass tacks

Dear Mr. Schmidt:

I enjoyed Marc Stiegler's novelette "The Third Alternative" (*Analog*, November 1987), but was put off by several unexplained and inexplicable aspects. It may be that the novel version, *David's Sling*, will include the missing aspects or explain their absence, but the story should not have been run as a novelette unless it could fit adequately in that format.

In the story, the Soviet Union has invaded West Germany and Denmark, but we have used new satellite-based weapons called Sling Hunters to destroy their submarines and their armor in Western Europe. We drive them out of Western Europe and then stop.

No explanation is given of why we stop, and it appears that it never occurs to anyone to drive them out of East Germany, Iran, or anywhere else before agreeing to a cease-fire. I can conceive of circumstances where the president would decide that taking away Eastern Europe would lead to a nuclear war, but I cannot conceive of any circumstances where the issue would not be raised.

One of the things that every country at war tries to do is to force the enemy to fight on a second front: this causes him to spread his forces thinner, and creates logistics problems for him. If we can destroy Soviet armor at will, using the Sling Hunter satellites, would we not destroy their armor on the Chinese border, to say nothing of planes and armor in Afghanistan.

The most incredible lapse in plausibility occurs at the end of the novelette. We have obtained a document showing that it is the official Soviet policy to start a major non-nuclear war whenever there is a weak president. As a result, we launch a non-nuclear preemptive strike. We have destroyed most of the Soviet nuclear capability, using the

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Sling technology, in an attack with only two fatalities. The Soviet general secretary is on the hot line to the president, and complains "You have attacked the sovereign territory of the Soviet Union," "You have destroyed billions of dollars in investment in our defenses," and "You launched a sneak attack against us." At no point does the president ask "What about your invasion of West Germany?" Nor does he mention the position paper which resulted in the preemptive strike.

"Willing suspension of disbelief" is a lot easier when it applies only to the technology; when characters act in a fashion totally at odds with their culture, the reader is entitled to an explanation.

SEYMOUR J. METZ

Annadale, VA

The author replies. . . .

President Forstil's "unnatural" behavior and America's decision not to drive the Soviets from Eastern Europe are both explained in the story—but both of the explanations are indirect. Both require the reader to draw inferences.

Why didn't we take Eastern Europe? The indirect explanation is given by the Soviet general secretary: "Such a destructive move would require nuclear retaliation. Was the new president, Forstil, so blind he couldn't see that?" Certainly, a discussion was held in the U.S. as to how far to drive the Soviets—but the Americans came to the same conclusion as the Soviets, the same conclusion as you yourself did in your letter, that nuclear escalation was too likely. The decision to stop at the border is not only past history when "The Third Alternative" begins, it is boring history. As such, it gets no more space in the book than it receives in the novelette.

Similarly, President Forstil explains his "unnatural" behavior: "We can't afford to play games here, general secretary." Both of your points—the invasion of West Germany, and the position paper—are peripheral, no matter how angering they feel to you or me (and the color of anger is tinted with the color of foolishness, as pointed out in the decision duel). Indeed, the West German invasion and the position paper are worse than peripheral: they are finger-pointing exercises (Yurii would say, "that position paper is a fraud," Hilan would say "no, it's not," and so on). The last thing you want to do with a nuclear-capable dictator is make him angry enough to push the button. Finger-pointing, in my experience, never has any effect on a discussion except to heighten the fury.

To suggest that refusal to finger-point is "totally at odds with [our] culture" is frankly uncredible to me. I agree that many people couldn't resist this particular temptation. But American culture covers a wide spectrum of people. If finger-pointing were that fundamental to American culture, we'd be in even worse shape than we are: you can find, here and there, mature individuals in our country (though I'll grant that it's less likely to have a mature American president! Perhaps it's even implausible—well, Hilan was not elected to the office by the political compromising process, he was appointed: perhaps he *could* be mature, given that background).

Specific examples aside, the general point that it "should not have been run as a novelette unless it could fit adequately," necessarily concerns me. Every story is a small set of events torn from a much larger universe. The more vibrant the author makes his universe before writing his story, the more difficult it is to yank the story from that universe

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without leaving loose threads. "The Third Alternative" is visibly yanked; interesting events occurred before the story begins, and others occur after it ends. For better or for worse, I have received the same comment about the *book* from several people who previewed it—the universe to which the book belongs is too large for a book as well. My only defense is that several people, including Stan Schmidt, did read the short story without reading the book first, to assure both *Analog* and myself that it could stand alone. I can only offer condolences that you did not find it effective in novelette form (though I might put in a plug here for reading the book version).

MARC STIEGLER

Dear Analog:

Please tell Michael F. Flynn for me that he has enormous talent and must be one of the most exciting SF writers around. *In the Country of the Blind* (Oct.–Nov. 1987) is refreshingly imaginative, a superb mystery story as well as an absorbing tale filled with technical lore from several fields, such as computer science and math. His style is superb.

I believe this novella would make a spellbinding movie or miniseries—if the scriptwriters don't butcher it. Let us have more from Flynn.

I hear these *Analog*s on disks for the handicapped, and treasure them.

GLORIA MINCHIN

Chicago, IL

Dr. Schmidt:

I've just finished reading "In the Country of the Blind," and I want to say that I definitely want to see more of Michael Flynn's work. In fact, I think Michael's stories are so good that we should use them as a new standard of excellence: we can refer to any knockout story as a "Mickey Flynn." In particular, though, I would like to see Michael confront a little problem I have with his Babbage Society.

Anyone who has watched James Burke lay out historical "Connections" on PBS knows that any would-be cliologist who wants to predict the likely courses of future history will have to predict the development of new technologies and the ways in which they will be used. But in order to predict any given technological development with any accuracy at all you must have enough information to achieve the development yourself. Now among the papers that Sarah Beaumont took from Randall Carson's abandoned computer room we find "Effect of Wireless Telegraphy on the Propagation of Ideons" (by Isaac Shelton, 1847), "Speculations . . . on the Non-Chemical Nature of the Ultimate Explosive" (by Randall Carson, 1871), and "Ideons Required for the Encouragement of Aerial Flight" (unattributed, 1862). So we have Isaac Shelton discussing radio only one year after Michael Faraday's well-publicized but vague speculation that light is a kind of transverse magnetic vibration, and fourteen years before Maxwell put a solid and clarifying mathematical foundation under it. We have Randall Carson talking about atomic power in 1871, though that's not too surprising: anyone reading Maxwell's 1864 paper "A Dynamical Theory of the Electromagnetic Field" could have gone by an easy deductive path to Special Relativity and all that it implies (the real surprise is that Maxwell didn't do it himself). And we have someone in 1862 writing about aerial flight (presumably heavier-than-air flight since lighter-than-air flight was an accomplished fact), something that could have been achieved in the 1870s

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if a fairly obvious improvement had been made in the railroads in the 1860s.

If members of the Babbage Society had the knowledge to create wireless telegraphy by the 1850s, heavier-than-air craft by the 1870s, and atomic power by the 1900s or 1910s, why did the Society not bring those achievements to fruition? It's certainly not that they couldn't do it: practical wireless telegraphy was invented by a young Italian aristocrat as a hobby and the first flyable airplane was designed and built by two bicycle mechanics as a hobby; even an atomic reactor like the one Enrico Fermi and his colleagues built at the University of Chicago in 1942 would not have been beyond the means of the Society at the turn of the century. The implication is that these advances and others were withheld or discouraged by the Society. The reasons for that are sure to be fascinating. The arguments that must have taken place within the Society would be truly interesting. Do you think Mr. Flynn will tell us about it?

DENNIS ANTHONY

Los Angeles, CA

Dear Dr. Schmidt:

The November editorial reminded me that I intended to write you a note when "Marooned in Real Time" came out. It's an outstanding piece of science fiction, and my idea of what SF is all about—extrapolation of real technical possibilities, and the effects they might have on people. I enjoy reading the softer stuff, of course, but that yarn was a rare treat, and a prime example of why I started reading SF.

I've sat in on several meetings of the Nanotechnology Study Group at MIT, and had a lot of fun batting these ideas around. We came to many of the same conclusions as Mr. Vinge. We didn't think economics would altogether disappear, though; even assuming most manufacturing is brought in on the premises of the consumer, some things will still be in limited supply: land, desirable locations, personal time, some elements, and maybe energy. We guessed that one major salable commodity would be software, including machine-readable designs for all sorts of physical objects from molecular size on up.

I'm not sure what to think of the Singularity. Certainly, one major implication of combining nanofabrication with advanced information processing is a resumption of human evolution, in directions we can't entirely foresee because we don't yet know what consciousness really is. That doesn't necessarily mean our descendants (or ourselves) will appear to vanish, though. Bear in mind that "obsolete" technologies and attitudes hardly ever go away completely. You and I don't know any buggy whip manufacturers, but we can be pretty sure there's at least one in this country—because there are still a few customers around for buggy whips. I know a hand weaver, I know of a potter, and I could probably be accused of archaism myself for writing and performing songs without the use of MIDI equipment or a desktop computer.

No line of development goes on forever at an ever increasing rate, either. It climbs for a while, but then the capability is fully realized, and the line levels off. What keeps the overall rate of development climbing is that some other line of development starts up after the previous one peters out. Example: the performance of most categories of aircraft hasn't improved greatly in the last 30 years, but better and cheaper communication has made some trips entirely unnecessary. So should we expect that successive waves of development will come ever more frequently

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because we can handle information faster, and build what we invent sooner? Maybe, but then there's probably some maximum processing rate that would be possible if all the matter in the universe were made into one supercomputer, with components having the minimum number of atoms needed in order to remain deterministic.

The time scale for all this looks uncertain. Certainly, once the technology gets far enough along for the first payback, practical applications and major R&D will come thick and fast. I haven't heard much about anybody doing the groundwork, though.

I haven't had a chance to see *Engines of Creation* yet; thanks for mentioning the commercial publication. If Drexler is as interesting in print as he is in person, it's going to mean a few lost nights of sleep.

JOHN A. CARROLL

Kingston, NH

Dr. Schmidt,

In your editorial "Great Oaks from Little Atoms" in the November 1987 issue of *Analog*, I believe you made an error of extrapolation. I realize that you are basing your editorial on Drexler's book, *Engines of Creation*, but you did write the editorial, and so I am holding you responsible for your statements (would that all politicians could be treated likewise!).

First, you state "the fact that nature made brains or anything else means that it can be done at least that well." A fine premise, but in science any premise should be trashed if at least one fact does not follow the premise. One fact that does not follow this premise is the moment of creation in the Big Bang. It definitely was done by nature, but can we therefore recreate it or do it better?

The Big Bang theory describes all matter in the current universe as being compressed into a small, very quickly rotating sphere about the size of an atom's nucleus. Necessarily, the normal laws of space-time as we have it now did not apply then. Yet our universe appeared very quickly (a few seconds, perhaps) from just such an extreme condition, with all current physical laws intact. Our universe evolved.

Your statement indicates that a natural evolution can be reproduced. Yet, by the very nature of the evolution of our universe from the Big Bang (creation of current natural laws) we cannot possibly reproduce a big bang. We cannot now or ever go outside the laws of physics to create the new. Consider the speed of light. Isaac Asimov states that it will always be a limit imposed on us by the physical structure of the universe itself (the set of laws describing space-time). We cannot ever have "warp speeds." By the same token we cannot reproduce the creation of the universe.

Are there other instances where we cannot reproduce nature? Perhaps. Black holes may be one, since the laws of nature do not apply near its center, beyond the event horizon, due to the extreme pressure of gravity.

The use of "nature" in your article (and here in this letter, following your lead from your editorial) implies an independent agent of action directing the course of natural events. Many scientists are coming to believe that our human evolution occurred too quickly. Was it directed? Would it be too great a leap to say that this agent of action, since it is directing natural events, implies that it exists outside the bounds of natural laws, and it is therefore beyond our grasp? Could we call it super-natural? Could we call it . . . God?

JOSEPH A. HUYCKE

Phillips, WA

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We can't go outside the laws of nature, true enough, but we're constantly finding out that there's more to them than we used to think! I'll agree that we *can't reproduce the Big Bang, but you haven't made a very compelling case for assuming that our descendants will never be able to. The brain, in any case, is in a different league: your argument concerning the Big Bang rests on the assumption that that happened according to* different *laws of nature than those now prevailing, but I know of no reason to suppose any such thing about the brain.*

Dear Dr. Schmidt,

Regarding Tony Rothman's article, *A Memoir of Nuclear Winter*, in the November issue, I agree with him completely. There are already enough people who distrust science and scientists. How many more will there be when they find out that a large number of scientists have deliberately lied to them, and what effect will that have on funding for science projects, teaching of science and the scientific method in schools, and the desire of children to become scientists?

I believe there is an even greater issue that almost everyone seems to miss because of the nearly complete emphasis on *nuclear* warfare, and this includes Mr. Rothman.

The number of casualties in World War II was approximately a factor of ten greater than in World War I, some 50,000,000 people, or more by some estimates. With the development of modern non-nuclear weapons systems such as: intercontinental missiles; handheld and other relatively short-range guided missiles; advanced chemical and biological weapons; long-range, almost undetectable, aircraft; it is easy to see the possibility of another tenfold increase in casualties in a possible Third World War, even without nuclear weapons.

Mr. Rothman thinks that a billion casualties is unacceptable. I think 500,000,000 is almost equally unacceptable. In dealing with the issues, let us not cast aside lightly the possibility that the horror of nuclear weapons, and the probability that the national leaders of the countries involved would be among the casualties, has so far prevented WWIII. As an indication of this, note that Europe has already had, since WWII, its longest period of peace since its nations were formed.

It is even possible that the so-called Nuclear Winter is a misnomer. The probability of such a reaction was based, primarily, on the burning of the world's 1,000 largest cities, through nuclear bombardment. During WWII, the city of Dresden was destroyed, as completely as Hiroshima, by a firestorm created by small incendiary bombs. I wonder if someone shouldn't calculate what would happen to those 1,000 cities, and the world's atmosphere, if the same missiles, emptied of nuclear warheads, were instead loaded with incendiaries.

What I am trying to point out is that, in concentrating so completely on eliminating nuclear weapons, we are failing to look carefully at the situation that would result. In the general euphoria which would undoubtedly follow, I think most people the world over would believe the problem was solved. But the problem is really much larger—we may even be able to destroy the world without nuclear weapons.

VICTOR V. MARINE
8306 E. Hermosa Dr.
San Gabriel, CA 91775 ■

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a calendar of analog upcoming events

27-29 May
V-CON 6 (British Columbia SF conference) at Gage Residence, UBC, Vancouver, B.C. Guest of Honour—Hal Clement, TM—James P. Hogan, Science Guest—John G. Cramer. Theme—The SCIENCE in Science Fiction. Registration—C$20 (US$16) until 16 May 1988, at the door rate to be announced. Info: V-Con 16, Box 48478, Bentall Centre, Vancouver BC V7X 1A2 Canada. (604) 738-8356.

3-5 June
GAYLAXICON (SF relaxicon for gay people & friends) at Provincetown, Mass. Registration—$15 until 29 February 1988, $20 afterwards, no at-door registration. Info: Gaylaxicon, c/o The Gaylaxians, Box 1051, Back Bay Annex, Boston MA 02117.

10-12 June
AD ASTRA 8 (Toronto-area SF conference) at Holiday Inn Airport, Toronto, Ont. Pro Guests of Honour—R.A. McAvoy, Orson Scott Card, Fan Guest of Honour—Fran Skene, Special Guest— Taral. Registration —C$20 until 15 May, C$25 thereafter. Info: Ad Astra 8, Box 7276, Station A, Toronto, Ontario M5W 1X9, CANADA

10-12 June
CONGREGATE (UK Regional SF conference) at The Moat House Hotel, Longthorpe, Peterborough, England, U.K. Guest of Honour—Terry Pratchett, Special Guest of Honour—Bob Shaw. Programme theme: Humour in SF. Registration—£5.00 supporting, £11.00 attending. Info: Chris Ayres, 67 Ayres Drive, Stanground, Peterborough, Great Britain. (Outside UK—include International Reply Coupons sufficent for airmail response).

10-12 June
CONVICTION (27th Australian National SF convention) at Shore Motor Inn, Artarmon, Sydney NSW. Guests of Honour—Spider & Jeanne Robinson, Carey Handfield. Registration—A$40 until 1 June 1988 attending, A$20 supporting. Info: Conviction, Box 272, Wentworth Building, University of Sydney, NSW 2006, AUSTRALIA

10-12 June
X-CON 12 (Milwaukee SF conference) at Red Carpet Inn, Milwaukee, Wisc. Guest of Honor—Somtow Sucharitkul, Artist Guest of Honor—Dell Harris, Fan Guest of Honor—Bruce Pelz, First Fandom Guest of Honor—Wilson "Bob" Tucker. Registration—$15 until 10 May 1988, $18 Terry Carr Memorial Membership (includes donation to American Diabetes Association), $20 at the door. Info: X-Con Ltd., Box 7, Milwaukee WI 53201-0007.

24-26 June
ATLANTA FANTASY FAIR (Fantasy art, fiction, films and gaming conference at Atlanta Hilton and Towers, Atlanta, Ga. Info: Atlanta Fantasy Fair, 482 Gardner Road, Stockbridge GA 30281. (404) 961-2347.

1-5 September 1988
NOLACON II (46th World Science Fiction Convention) at Sheraton Hotel & Towers, Marriott Hotel, Rivergate Convention Center, New Orleans, La. Guest of Honor —Donald A. Wollheim, Fan Guest of Honor—Roger Sims TM—Mike Resnick. Registration—$70 to 10 July, more at the door, Supporting—$30. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Nolacon II, 921 Canal Street #831, New Orleans LA 70112 (504) 525-6008.

—Anthony Lewis

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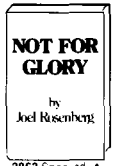

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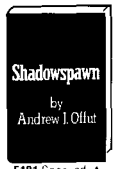

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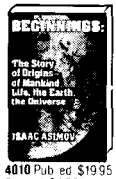

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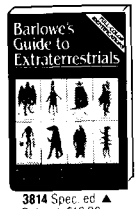

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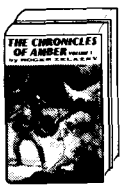

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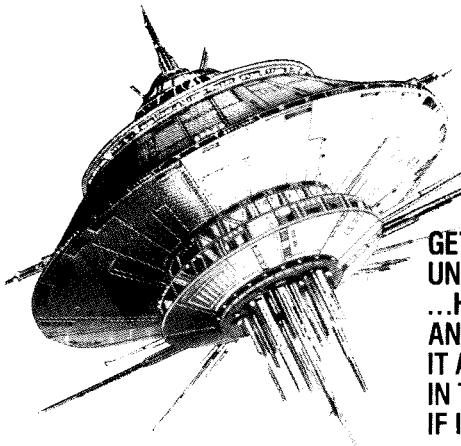

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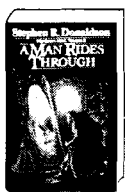

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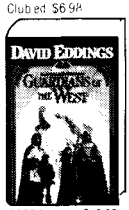

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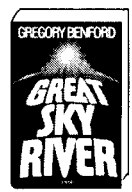

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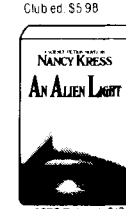

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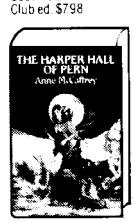

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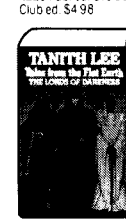

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